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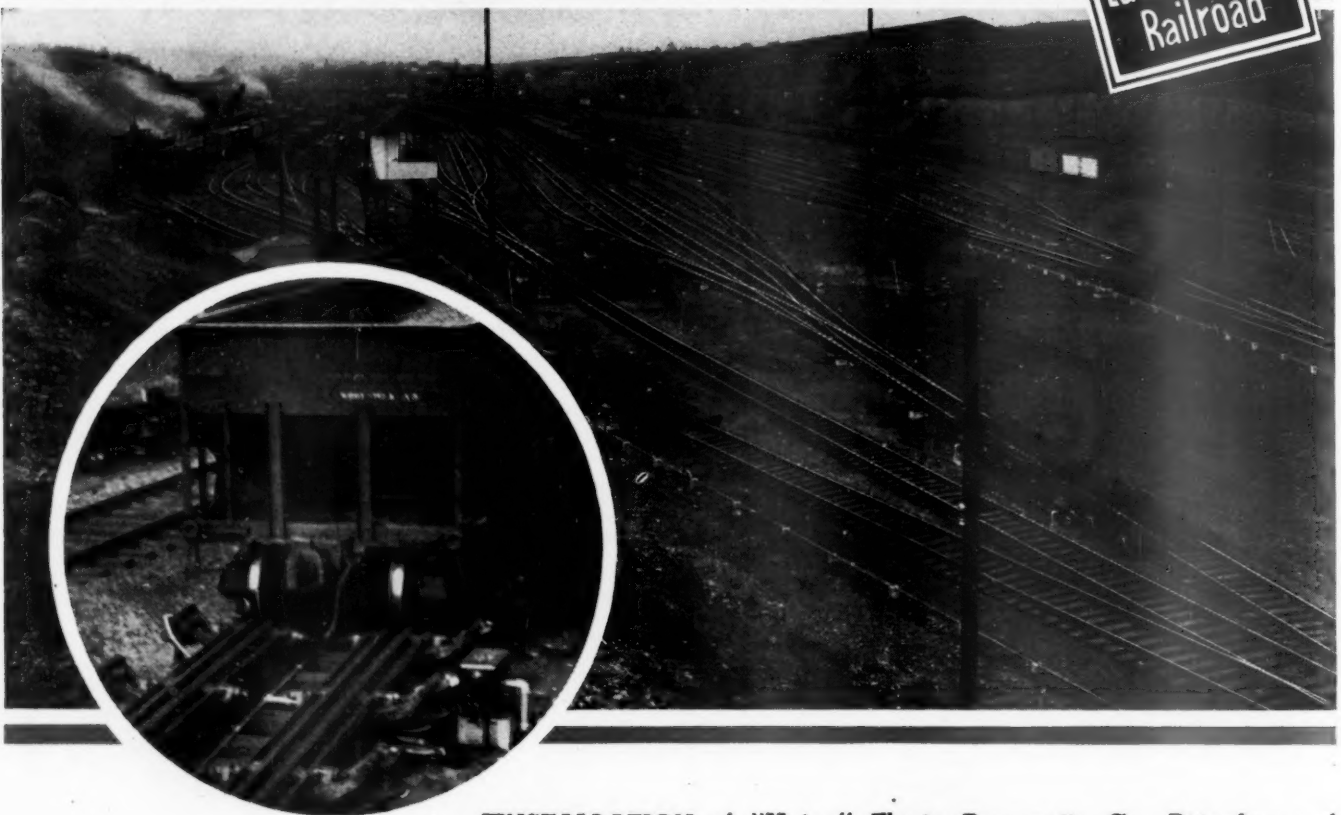
OPERATING REVENUES AND EXPENSES 550

The Railway Age is indexed by the Industrial Arts Index and also by the
Engineering Index Service

RETARDERS

***Expedite Traffic and Reduce
Operating Expenses at***

HAMPTON YARD

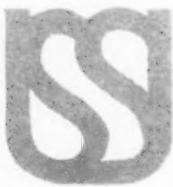


INSSTALLATION of "Union" Electro-Pneumatic Car Retarders and power switches in the Hampton classification yard of the D.L. & W. at Scranton, Pa., has facilitated freight car movements on the entire railroad.

An interesting feature is that delays to road trains at other points have been minimized by reducing switching and classification at these points. Thus road time of trains has been reduced, effecting a decided reduction in overtime of crews, as well as increasing the time in which locomotives are available.

Expediting traffic has resulted in making deliveries several hours sooner. This is important in connection with manifest freight in competitive service. It also enables the D.L. & W. to get empty cars off the line quickly.

Why not investigate the operating advantages and money-saving possibilities of "Union" Car Retarders?



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The Week at a Glance

CARLOADINGS: In the March 5 week freight car loadings totaled 553 thousand, off 24 per cent from last year.

EQUIPMENT: The Canadian Pacific has ordered 15 Pacific and 10 Hudson type locomotives, and expects to place contracts for 10 of the Mountain type within a few days. It has also purchased 2,800 freight cars. The Rock Island will get 10 Diesel-electric switchers.

MORE RATE RISES? The I. C. C., and Commissioner Eastman in particular, pointed out in the rate decision that there are a large number of rates which can be increased without any further action by the Commission. We have no official information as to what particular rates they may have in mind—but we incline to the view that among the number may be included the rates on non-ferrous metals, on dairy products from the near Northwest to the Atlantic seaboard, and perhaps some cotton rates.

DAM FOOLISHNESS: Ben Bernie, the old maestro of the air, has a new ditty about Uncle Sam's weakness for building dams that ought to help laugh the whole dam business into the ash can—if everybody could hear it. The burden of the song is that the rich old uncle, who isn't right bright, builds dams all over the lot—"whenever he sees cement he wants to mix it." The old maestro winds up with a plea for a dam from the Bronx to the Golden Gate, and from the Irish Free State to the Empire State.

SMOKELESS LOCOS: When locomotive smoke is abated, economical operation is also furthered—so that sane smoke abatement laws are more a blessing than a curse. Such is the declaration of James Partington, manager of Alco's engineering department, in a recent paper which is abstracted on another page in this issue. Mr. Partington discussed some of the principal points which have to be watched in locomotive design in order to secure the maximum efficiency in combustion and the minimum output of objectionable smoke.

I. C. C. PASSES BUCK: By comparison with the general price level and by Constitutional guarantees of a chance to earn a "fair return," the rate increases, which the I. C. C. has granted only in part, were justified in their entirety. The leading editorial herein points out, however, that railway difficulties are due to inadequate traffic, and to costs and taxes that are too high—quite as much as to inadequate rates. The rate increase, even if it had been granted in full, would have been no panacea. The major task in railway rehabilitation would still have remained to be done. This task consists of restoring economic conditions which will bring traffic revival, the ending of subsidies and special favors to rival agencies of transportation, the cessation of unprofitable

railway services (or reducing their costs so that the unprofitable become profitable), and the limitation of wage rates and taxes to the ability of the railways to pay them. Restoration of railway prosperity is still possible, the editorial contends, in these fields over which the I. C. C. has no jurisdiction. The rescue job is now up to managements, the unions and the government.

FUEHRER WHITNEY SPEAKS: A. F. Whitney, the Hitler of the B. of R. T., has let the world know what thoughts he has decreed for trainmen to think regarding the proposed decrease in railway labor costs. Trainmen will, he threatens in a statement to the press, come out for government ownership if the present inflated wage scale is attacked. He wants the railways to solve their problems by writing off "watered" stock and reducing bond interest to 3 per cent. In other words, in order to pay the people who pay Whitney's wages more than they have ever received before, just take the necessary money away from investors whose money has made railroad jobs possible. Meantime, while some of the "conservative" railway labor leaders seem to think that the capital need to provide railroad jobs can be had by hi-jacking, the reputedly "radical" labor leader, John L. Lewis, warns that "it is time for labor to recognize the right of capital to have a reasonable return upon its investment."

SARGENT'S PLAN: To solve railroad problems Mr. Sargent presented a detailed plan (set forth elsewhere herein) to the Senate committee investigating railroad financing. Among other things he urged compulsory consolidation and pooling (either by the I. C. C. or a new transport board, which authority should also have power to revise working rules in train service to give the railroads 8 hours of work for 8 hours' pay). He also advocated abolition of free transportation, the financing of railway capital requirements by the Reconstruction Finance Corporation and the ending of land-grant rate reductions.

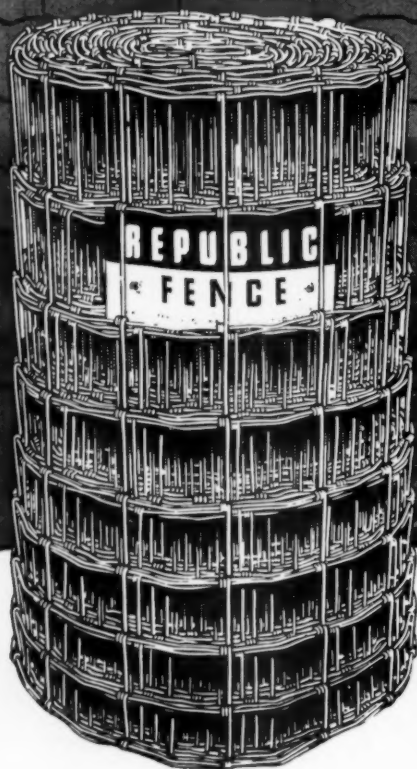
WHY THE HATRED?: The eminent politicians who head the railway labor organizations issued a "hand-out" to the press on Wednesday announcing their refusal even to consider a wage reduction. To take such stand is their right—but the "boys" went out of their way to try to hold up the railroads to public obloquy, representing them as a panhandler with a tin cup. Even if they do hate railroads and railroading, these gentlemen might at least learn a little something from the marine unions who have carried on such a campaign of vilification of their employers that they are scaring the public off of American ships. Can an industry held up to the public as a "bum" hope to win the patronage which makes jobs possible?

SEC. 4 FILIBUSTER: Knowing full well that a comparatively early adjournment of Congress is in prospect, the Pettengill opponents have appeared before the Senate committee on interstate commerce with a demand that it give ear to the rhetoric of 70 witnesses. Illustrative of the fair-mindedness of some of these pleaders for privilege (whose contentions are reported herein) is a fact brought out by Senator Minton—the Merchants' Association of New York (a Pettengill opponent) does not include railroad men on its traffic committee, but it does give representation to truck operators.

NEW TRANSPORT BOARD?: Among the many suggestions made for meeting the crisis in transportation is the creation of a 3-man federal board to study transport in all its phases and make recommendations to the legislative and administrative branches of the government as to remedial measures. Proponents of the plan point out that the federal government regulates—and thus has official advice upon—railroad construction, rates and finance, but that it has no unified policy as to the construction of competing transportation facilities. The function of the new board, if created, would be to assist the government toward a comprehensive transportation policy, and to make recommendations and studies in the field of labor relations, consolidations and the like.

HIT A. A. R.: Fred Sargent, Patrick Joyce and Luther Walter on Wednesday of this week appeared before the Senate committee investigating railroad finance and complained of the inability of the A. A. R. to settle controversies among its members over divisions of through rates and charges for privately owned cars. Mr. Sargent specifically criticized some of the C. & N. W.'s western connections for the divisions they take and said that some board members of Western Trunk Lines are also on the boards of the Western lines and hence do not defend solely the Western Trunk Lines' interests. Messrs. Joyce and Sargent also contended that several big roads virtually dominated the A. A. R. Mr. Sargent urged that the I. C. C. supervise contracts between the railroads and the Pullman Company. Mr. Walter also suggested I. C. C. examination of all contracts for the purchase of rails, and urged that the same federal body which fixes rates should also have authority over wages.

DONALD DUCK IN D. C.: W. H. Chandler, the explosive spokesman of New York shipping interests bent on keeping legalistic shackles on the railroads if they can, was neatly told off by Senator Schwartz at the Pettengill bill hearing this week. The scolding Chandler reminded the Senator of an old court room maxim: "If the facts are on your side, present the facts; if you do not have the facts and the law is with you, argue the law; if neither the law nor the facts are with you, give the other fellow hell."

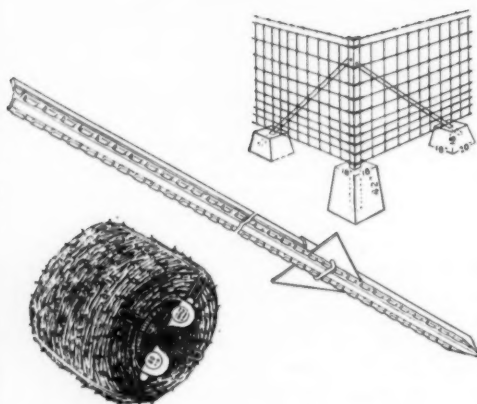


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On the Mercury — New York Central's modern high-speed train between Cleveland and Detroit, shown above — the kitchens are made of gleaming ENDURO, Republic's Perfected Stainless Steel.

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RAILWAY AGE

Politics Has Held Down Rates— Will It Now Permit Lower Costs?

The measure of legitimacy of government regulation of the railroads and other public utility enterprises lies in the extent to which it succeeds in enforcing the conditions which free competition would establish, if such competition were workable. Effective regulation of railway rates by the Interstate Commerce Commission began in 1906. In 1937 the general price level was 41 per cent higher than in 1906, while the average revenue per ton-mile of the railways was only 25 per cent higher. The railway industry had already reached full maturity by 1906 and, hence, in the past 30 years could not have been expected to achieve the phenomenal reductions in costs which are associated with the early stages of an industry's growth (as has occurred, for instance, in the past 20 years in the electric utilities and in automobile manufacture). That is to say, there has been no technological revolution since 1906 to explain or justify a railway rate level today so far below the level of general commodity prices as that which existed in 1937 in comparison with 1906.

A Higher Rate Level Economically Justifiable

The full increase in rates which the railways sought in Ex Parte 123 would have done no more than restore the relationship between freight rates and commodity prices which existed before political *force majeure* became the dominant factor in rate making. The full increase would still have left the railroads short of the earnings to which they are entitled under the Constitution. If the rates sought had been at a level in relation to prices far above that which existed before effective regulation began, the Commission might have been excused on sound theoretical grounds for hesitating to try to apply the recognized Constitutional doctrine on "fair return." But grounds for such an excuse did not exist. In fact no excuse existed—except the Commission's not uncommon human weakness, when faced with a difficult problem, of avoiding it in the hope that some one else would prove sufficiently energetic and daring to relieve them of the responsibility.

In January of this year, freight operating revenues were 19 per cent lower than in January, 1937. For the entire year 1937 freight revenues totaled 3,378 millions. Reduced by 19 per cent, that total would be 2,736 millions—which may be taken as prospective freight revenue in 1938 without any increase in rates and with no recovery in traffic. Increasing this figure by 5.3 per cent to allow for the recent rate advances,

we have a total of 2,881 millions as prospective 1938 freight revenue based on January traffic and the new level of rates. Assuming that passenger and other revenues are the same in 1938 as in 1937, 1938 operating revenues should, without traffic revival, total 3,669 millions. With the operating ratio at the January level (83.33 per cent), the prospective operating revenues would, after taxes, yield net railway operating income of less than 200 million dollars. Each point by which the operating ratio can be reduced, however, would, on this basis of calculation, add 36.7 million dollars to net railway operating income. And, of course, a genuine revival in traffic would completely alter the outlook.

I. C. C. Passes the Buck

In its decision the Commission clearly acknowledged "the duty we are under to avoid putting rates upon a basis which would compel the use of property without just compensation, although the Constitution does not protect against all business hazards." Having made that acknowledgment, the Commission then proceeded to permit rate increases which, even on the basis of 1936 traffic volume, would produce net railway operating income several million dollars short of the net operating income of 667 millions the roads earned in 1936, which was at the rate of 2.6 per cent upon the property investment.

Since less than 2.6 per cent on invested capital is undeniably below the level of "just compensation," the I. C. C.'s excuse, if any, for failing to provide rates to permit a return at a constitutional level must lie in those "business hazards," against which, it says, the Constitution does not require it to protect. What, then, are these "hazards"? Certainly the present business "recession" is not among them, because the net railway operating income the Commission aimed at is based on the 1936 volume of traffic—not that of today. What are the other "hazards" against which the Commission does not feel itself obliged to protect the railroads? Since, in the Commission's opinion, they do not lie in the present "recession" in the volume of traffic nor in the level of rates (over which the Commission obviously has control), there is only one other place to look for them and that is in *expenses and taxes*. The Commission's decision has in it a large measure of "passing the buck," but the only realistic attitude must be to face the facts and see what can be done in the domain of operating expenses and taxes. The

Commission does not make definite recommendations in this respect, but it does give a significant survey of the evidence.

Wages, Material Costs and Taxes

Table 1 herewith shows a comparison by the Commission of railroad expenses in 1929 and in 1936, with an estimate of what 1936 expenses would look like in the light of present wages, prices and taxes. The significant increases which have occurred to worsen the financial condition of the railways since 1936 are clearly shown from this table to be in wages (a rise from 42.9

Table 1—Increases in Expenses and Taxes

	Cents per dollar of operating revenues		
	1929	(Actual) 1936	(Adjusted for present wages and prices) 1936
Labor	42.6	42.9	46.5
Locomotive fuel	5.4	5.9	6.5
Materials, supplies, etc.	17.7	16.4	18.7
Loss and damage*	2.0	2.3	1.5
Depreciation and retirements	4.1	4.8	4.9
Taxes	6.3	7.9	9.0
Hire of equipment and joint facility rents—net	2.0	3.3	3.3
Total expenses and taxes	80.1	83.5	90.4

* Including injuries to persons, insurance and pensions; but in the adjusted figures for 1936 pensions are covered by taxes.

cents per dollar of revenue to 46.5 cents); in the price of fuel and supplies (increased from 22.3 cents per dollar of revenue in 1936 to 25.2 cents on the basis of present prices); and in taxes (risen from 7.9 cents per dollar of revenue to 9 cents).

The report draws attention to the narrowing spread between gross revenues and net railway operating income, set forth in Table 2 herewith. It will be seen that in 1905, before the I. C. C. was given effective control over rates, more than 30 per cent of all gross revenues remained after operating expenses and taxes had been paid, and that this percentage has declined ever since. The Commission says itself that "if current cost and rate levels had existed in 1936, the showing in 1936 would have been the most unfavorable of any year since 1920, not excepting 1932." We submit that the comparison we have given above between current price levels and railway rates, and that which existed prior to effective rate regulation, which began in 1906, shows conclusively that the I. C. C. must share in the responsibility for the inadequate ratio of net earnings which has characterized the entire period of its effective authority. But there is a cost side, as well as a rate side, to this picture of progressive railway starvation.

Wages Increase Faster Than Employee Efficiency

The Commission cites the fact that, while employee efficiency (traffic units per employee) increased from 226 thousand in 1916 to 381 thousand in 1936 (an improvement of 68.5 per cent), the average wages per employee were twice as large in 1936 as in 1916. The

traffic units produced per pay roll dollar were 317 in 1916 and only 220 in 1936. Hourly wages of employees in 1937 were the highest in history, at a time when the margin of railway net earnings to gross was approaching the vanishing point. Shippers who opposed the freight rate increases cited the high railway wage rates, in contrast with the much lower scales paid by a number of important industries and in certain sections of the country.

In this connection, it is timely to note that John L. Lewis in his radio broadcast to England on Tuesday of this week said: "It is time for labor to recognize the right of capital to have a reasonable return upon its investment." Is there any leader of the railway labor organizations with foresight enough to recognize this obvious fact? If so, what responsibility does he believe organized labor has to bring it about?

The Commission points out the notorious unprofitability of passenger service, with an operating ratio in 1936 of 106 per cent in the East, 127 per cent in the South and 137 per cent in the West. These ratios are, of course, derived by arbitrary cost-assignment and are not conclusive. The question is not, however, so much as to the extent of net earnings of the service, because in all probability there aren't any. Rather the real question is whether there may be any other manner of conducting the business which would make a better showing in net railway operating income. That is, can trains not earning their operating expenses be discon-

Table 2—The Narrowing Spread Between Revenues and Expenses

Year ended	Operating Revenues Millions	Net railway operating income	
		Amount Millions	Per cent of operating revenue
June 30, 1900	\$1,487	\$481	32.4
June 30, 1905	2,082	633	30.4
June 30, 1910	2,812	805	28.6
June 30, 1915	2,871	683	23.8
December 31, 1920	6,178	17	0.3
December 31, 1925	6,122	1,121	18.3
December 31, 1929	6,279	1,252	19.9
December 31, 1930	5,281	869	16.5
December 31, 1932	3,127	326	10.4
December 31, 1936	4,053	667	16.5
December 31, 1936	*4,017	*384	*9.6
December 31, 1937	4,166	590	14.1

* Readjusted to present cost and rate levels.

tinued without injury to net operating income as a whole? Or can present unprofitable trains be rendered profitable by reducing the costs of operating them?

What Managements, Labor, Government Can Do

Since the Commission has no authority covering the reduction of operating costs and taxes, obviously, then, it has relegated the job of rescuing the industry from the condition in which it now finds itself to individuals and groups whose policies *do* affect the utilization and the price of labor, the utilization and price of fuel and supplies, and the taxation of the railway industry. Aside from individuals, the groups which can establish policies which will reduce railway expenses are:

Railway managements. To reduce labor costs, railway managements, we believe, should first endeavor for

humanitarian as well as economic reasons, to get the labor organizations to agree to the elimination of all "make-work" arrangements (which force the discharge of employees whose work has value, in favor of the retention of other employees whose services are not needed). They might well go further in an effort to secure labor union assent to ending all payments for work not actually done (such, for instance, as extravagant mileage wage payments to train and engine employees and the lack of common sense justice in "back pay" cases taken to the National Adjustment Board). Furthermore, in the interest of the continued operation of a substantial part of the existing railway system, managements should, and undoubtedly will, seek reductions in basic wages of all employees to rates more nearly within the capacity of the industry to pay.

Failing prompt union co-operation in securing adequate reductions in labor costs by the more humane method of eliminating pay for unnecessary service and for work not done, and by reasonable concessions in basic wage rates, the managements' only alternative to lower labor costs will be by means of large-scale consolidations and "co-ordination," and the ruthless elimination of branch lines and train services which are not yielding a fair profit.

There is little that railroad managements can do in the way of reducing fuel and material costs that they do not strive constantly to do already. But there have been great advances in the design of many kinds of equipment in recent years—and large operating economies are undoubtedly obtainable by acquiring such improved equipment to the limit of railroad ability to finance its acquisition.

Labor's Responsibility to Maintain Employment

Organized railway labor. Realizing that labor costs have got to be reduced, the railway labor organizations will obviously serve the interest of their members better if they accept these reductions in a manner to insure the future employment-giving power of the railway industry, rather than by insisting on their present pound of flesh even if it kills the industry for the future. The route to lower labor costs through reason-

able reductions in basic wages and in eliminating compensation for hours not worked will assure for the future the maximum maintenance of the employing power of the railway industry. But if there is no way to reduced labor costs save through large-scale consolidations and "co-ordination" and abandonment of railroad facilities—then railway labor's sacrifices will be permanent rather than temporary.

Government. Besides its obvious first responsibility to "temper the wind to the shorn lamb" in the way of a moderation of its tax exactions, government has a further contribution to make in the removal of artificial legislative and administrative handicaps which impede the railroad managements from making necessary adjustments in their labor costs. Government likewise should modify its interference in behalf of artificially high prices for the materials the railways purchase (such as coal, for instance). And it should desist from its general policies of taxation and regulation which have reduced the volume of production of all industry, and hence the volume of traffic available for movement by rail.

Above all, government owes to the railroads—not as a favor to help them out of present difficulties, but as an act of simple justice—its abstention from further unconscionable subsidies to railway rivals, its removal of artificial and logically untenable handicaps, such as the long-and-short-haul clause, and its resolute refusal to enact into law such racketeering measures as the train limit bill.

* * *

The difficulties of the railways could have been surmounted temporarily by a substantial increase in rates. The fact that this relief has been denied does not mean that the situation is hopeless. A solution in the long run could only be had, anyhow, by the adoption of government policies limiting subsidies and other favors to competitors and by an understanding that railway wage and tax payments must bear some relation to ability to pay. The decision in the rate case simply means that government, railway managements and railway labor have got to tackle these fundamental questions realistically and at once, instead of delaying further in meeting them.

Something for the President's Transport Conference to Ponder

We now have a large surplus of transportation facilities—rail, motor, water, and air—and are likely to have for many years to come. But we still think of investing vast sums of public monies for more inland waterways. We talk about help to the rail carriers, and at the next moment we urge the setting up of seven little TVA's in seven sections of the country—primarily for the purpose of enlarged transportation facilities. We suggest that the railroads in the Eastern Territory should have help from increased rates or from loans from the Federal Treasury or from both—and I am convinced that they need more net revenue. At the same time we labor to persuade the people of the United States to invest hundreds of millions of public monies—in very considerable part from the people of

From an Address by Dean Charles L. Draper, of Syracuse University, Before the Syracuse (N. Y.) Traffic Club

New York State—in making an ocean-going canal out of the St. Lawrence River.

I still believe that two and two make four, but I observe that a good many people seem to think that two and two make only two.

This surplus of transportation cannot be ignored or forgotten by those who have the authority and the responsibility to supply transportation facilities in large part at public expense. To add to the existing surplus, unless the need in particular places and sections is unmistakably clear, is to accentuate the fierce and wasteful competition between the different carriers, which we have had for at least seven years. To do this is to spend public monies where and when they are not needed in the public interest.

Modern Locomotive Design and Smoke Prevention

Smoke abatement effected by improved design and efficient performance of modern equipment*

By James Partington

Manager Engineering Department, American Locomotive Company

IT is generally recognized that the maximum capacity of the locomotive boiler is the measure of the performance possibilities of the locomotive. This recognition is reflected in the designs of modern locomotives which have, as a rule, generously proportioned boilers capable of large steam output. The economical generation of steam in locomotive boilers and the prevention of smoke are closely related and involve generously proportioned boilers and a well-controlled combustion of the fuel insuring the least possible amount of unburned hydro-carbons in the front-end gases.

In 1914, the American Locomotive Company published a pamphlet entitled "Locomotive Ratios" which included figures on steam generation. They were determined from a study of very extensive performance data collected by F. J. Cole, then chief consulting engineer of the company, and represented good general average service results as obtained at that time. A comparison with present-day performance is interesting.

Cole's recommendation was that the maximum economical rate of combustion be taken as 120 lb. per sq. ft. of grate per hr. with bituminous coal of good quality. This figure still stands today as recognized good practice.

The striking difference comes in a comparison of steam consumption per horsepower. Cole's suggested ratios show, for superheated-steam locomotives, 20.8 lb. of steam per hp.-hr. The performance of modern locomotives with a working pressure of 275 to 300 lb. show that as low a figure as 16 lb. of steam per hp.-hr. can be used as a designing ratio, although much lower figures have been obtained in numbers of tests. This shows an improvement of more than 20 per cent in the utilization of the steam produced.

Modern locomotives will develop between 4,000 and 5,000 cylinder hp., which may require a boiler output of 80,000 lb. of steam per hr., exclusive of that required for accessories, such as steam heat, air pumps, etc. If we consider $2\frac{1}{2}$ lb. of coal per hp.-hr., we have an hourly combustion of 12,500 lb. The burning of this quantity of fuel requires the proper size of grate and all other factors on which good combustion depends. This gives us a graphic picture of the necessity of having (1) a boiler with sufficient heating surface to meet the evaporation requirements, and (2) all other adjuncts properly designed for the needs of efficient combustion. This is by no means an unusual combustion chore—many modern locomotives equal this and numerous others burn a greater amount.

In burning this quantity of bituminous coal, it is not

possible to avoid smoke, but the designer and the operator should be alert to keep the amount of smoke down to a minimum, especially in areas of congested population where regulation by the local governing bodies may be at times irritating to the railroad fraternity. The question of smoke prevention, however, is so intimately bound up with economical operation that sane "smoke laws" are more of a blessing than a curse.

Improvements in Locomotive Design Have Improved Smoke Performance

Much of the motive power in suburban service is still hand fired and smoke-prevention devices for this class of equipment show little change in recent years, the brick arch and suppressor jets over the fire bed being the sole survivors of a host of devices that have been tried and found wanting.

With the old straight tube-sheet boilers without an arch, it was practically impossible to fire any coal having more than 30 per cent volatile without making plenty of smoke, but the addition of an arch made it possible to use fuel having up to 35 per cent volatile without causing smoke conditions that could not be tolerated. But this result can only be obtained by the exercise of considerable skill and extra labor on the part of the fireman.

With respect to modern locomotives, hand firing is of little importance. Capacities have become so great that some sort of mechanical device for supplying the fuel to the firebox is absolutely necessary. Stokers of various types have been developed to meet this need and relieve the fireman from practically impossible exertion. These devices also permit the constant and uniform supply of fuel so necessary to smokeless operation, as a thin fire can be carried without the risk of loss of steam pressure when there is a sudden increase in the demand for steam as at the foot of a grade. Where it would be necessary to carry a fire 12 to 14 in. in thickness if hand fired, a good stoker can meet the same demand for steam and change of pace in the combustion of fuel with a 4-in. to 5-in. fire.

The stoker also gives us an opportunity to obtain a more satisfactory grate arrangement. As all the air for the primary combustion of coal must be drawn through the grates, we can now use larger grate surface and smaller openings in the grate bars themselves than was permissible in a hand-fired locomotive. There has been the widest divergence in the design of the air openings in grates. It was thought until a few years ago that the maximum possible air space consistent with keeping the coal out of the ash pan was the mark to shoot at; the theory was that as all the primary air had to be

* A paper presented before the Central Railway Club, Buffalo, N. Y., Thursday, March 10, 1938.

drawn through the grates anyway, as few impediments as possible should be placed in its path so as to use the lowest possible back pressure to induce the draft required. However, with the use of coarse grates, abrupt lengthening of the cut-off or slipping of the engine tore the fire to pieces, thus contributing to steam failures.

On one of the western roads, where the coal was rather light and hard to hold under the best conditions, a set of the now well-known pin-hole grates was applied which reduced the air openings to the neighborhood of 15 per cent. Not only was the fire carried better, but actual fuel saving resulted, and the anticipated trouble from clinkering did not materialize. Now it is rare to find a set of grates in a locomotive with more than 25 per cent air opening, 20 per cent being the prevailing average. It will be generally conceded that the modern grates are important aids in the smoke reducing campaign due to the better control of the fire bed thus made possible.

The best friend the "smokeless fireman" has is undoubtedly the brick arch. Although this device was applied to a considerable extent to locomotive fireboxes over 35 years ago, it is astonishing what wide differences of opinion are found in its application. It appears to have been proved that for maximum efficiency all the gases over the fire bed should be deflected by the arch to the longest possible route from the grates to the tubes, and that any short circuiting results in a loss of efficiency. This implies the tight setting of the bricks against the flue or inner throat sheet, and with proper drafting this has been found to be possible without plugging the bottom tubes, yet it is remarkable how common the use of the spacing brick, a relic of the hand-firing days, is in modern practice.

The Return of the Combustion Chamber

Another useful device, especially in connection with the brick arch, is the steam-jet smoke suppressor. This comprises large hollow stays in the firebox sides just above the normal top of the fuel bed, provided with steam jets that induce a current of air to flow over the fire surface. It is quite effective in conjunction with the blower when shutting off with green coal on the bed.

Modern methods of boiler construction permit the wider use of a feature of design that was formerly far from popular on account of the trouble experienced from leaks where they did the most harm. I refer to the combustion chamber. When we consider that when working at capacity the entire gaseous contents of the firebox must be changed in one-seventh to one-tenth of a second, the necessity of providing the longest practical gas path is apparent if we are to have efficient combustion. To obtain this, the combustion chamber has long been recognized as good design, but the difficulty of keeping the riveted joints tight resulted in its abandonment in many cases. With the modern practice of butt-welding these joints and avoiding the double thickness of metal that caused the trouble, the combustion chamber is coming back. In a recent instance, two boilers, one without and one with a combustion chamber, the latter showed an average gain in boiler efficiency of approximately 10 per cent.

Of all classes of steam-generating apparatus, the locomotive boiler is subject to a wider range of demand than any other, unless we except destroyers and torpedo boats, and most of us know how they handle the smoke question. To promote efficient as well as smokeless combustion, certain definite relations between the furnace volume and the amount of excess air are essential, yet in

the locomotive as the rate of firing goes up the percentage of excess air goes down for obvious reasons. According to power-plant practice, we should have a ratio of cubic feet of firebox volume to square feet of grate surface of at least ten, but the structural limitations of the locomotive hold us down to four and a half or less. Fortunately, the firebox temperature increases with the rate of combustion and as the velocity of the combustion reactions also increase very rapidly as the temperature increases, we can fire at rather high rates without excessive losses from undeveloped heat, provided our design keeps the body of the burning gases in as compact and symmetrical form as possible until they enter the flues and all reaction ceases. The importance of consolidating the gas body until all combustion has ceased is frequently unappreciated, and the usual method of conducting tests rarely brings out important data indicating this fact.

The usual Orsat apparatus does not detect the presence of unburned hydro-carbons such as methane, which if present, is taken out as CO₂. Yet, when the gases are chilled before combustion is complete, the hydro-carbons present in the sample may easily amount to one per cent or more. It is known that, in a specific case, the presence of one per cent of unburned hydro-carbon in the front-end gas indicates a loss of more than two per cent of the entire heat contained in the coal, and that this and much larger losses are constantly occurring.

There is some difference of opinion as to the effect of moisture in the coal. It is generally conceded that small amounts up to five per cent, speed up the combustion of CO, but that large amounts act to retard combustion besides carrying an excessive amount of heat out of the stack. Practically, however, locomotive fuel, especially run-of-mine, requires wetting down, and the losses are compensated by the reduction in smoke and the increased amount of slack that reaches the grates instead of being blown over the arch without becoming ignited at all. The moist slack also distills its volatile matter more slowly, permitting better and more complete combustion.

Front-End Design

It is just about forty years ago that the whole question of locomotive front ends was to be settled once and for all. Elaborate tests were made at Purdue University under the direction of the American Railway Master Mechanics' Association and a standard evolved that seemed to work about 30 per cent of the time, but almost every other man you met had different ideas on the subject and none agreed to any great extent.

Then another elaborate research was made at the University of Illinois, resulting in much valuable information for the student but mighty little help to the road foreman who had to go out on the road and make the engines steam.

The next episode was an epidemic of nozzles; square nozzles, oblong nozzles, stars, waffle irons, radial-ported, annular ported and pepper-boxes of every imaginable size and shape. Most of them did very well near their place of birth, but few survived transplanting. Then the netting displayed varying phases. Starting with a straight sheet across the front end, it became vertical cylinders, horizontal cylinders, cubical boxes, rhomboidal boxes, and baskets of various shapes. Most of these got by in some sort of fashion, but the most vigorous survivor seems to be the plain barrel type on account of the ease with which the front tube sheet can be inspected. But again we have examples of the extreme delicacy of these devices when removed from their native habitat; a front

end that had become practically standard on a large trunk line was installed under expert supervision on another road in the same region, and failed to make a successful trip.

I think I have covered the principal developments of locomotive design as affecting smoke performance, but I must add that no matter what the designer may do in suitably proportioning the boiler and related parts, their adjustment and maintenance in a high state of operative efficiency is up to the terminal and road foreman.

Much of what I have said has been sort of a resumé of knowledge gleaned by our men who are in direct contact with the railroads, and who know the difficulties and restrictions imposed on the railroads by enforced economies caused by reduced earnings.

The locomotive builders are in full sympathy with the movement for smoke abatement in the operation of locomotives and are ready at all times to cooperate to the greatest extent possible.

High-Speed Articulated Locomotives

In the designs of locomotives built recently, increased locomotive efficiency is indicated by better performance and greater availability. Lower maintenance costs measured on the basis of service performance will also be realized. In many of these locomotives there is a definite trend shown to reduce the amount of power transmitted through the main drivers, but still maintaining just as powerful a locomotive. This is reflected by the number of four-cylinder single-expansion articulated 4-6-6-4 locomotives with relatively large driving wheels, which have been recently placed in service, or are under order. This includes 40 locomotives for the Union Pacific, 27 for the Northern Pacific, 10 for the Denver & Rio Grande Western, and 7 for the Western Pacific. This type has been installed by these railroads to provide a locomotive that will haul heavy tonnage on their mountain divisions at increased speeds.

The use of four cylinders has made it possible to keep the diameter of the main driving axles and the diameter of the main crank pins smaller in the ratio of the reduction in piston thrust and spread of cylinders. This more normal size of journals, which is a distinct help toward the elimination of hot boxes and hot crank pins and the reduction in dynamic augment secured for all of the driving wheels, makes possible increased speed without bringing in its wake increased operating and maintenance difficulties of large magnitude.

All of these locomotives have been favorably cited as easy riding locomotives, which, aside from improvement in counterbalance features means that they take the curves more smoothly, making them easier on the track and also definitely more economical from the standpoint of repairs, especially repairs to running gear.

A very definite trend to higher boiler pressures is noted and also the provision of very ample boiler capacity to provide the reserve power so necessary in maintaining the faster schedules now adopted by most of our railroads.

Greater tender capacity for both water and coal cut down the number of stops for water and fuel. On account of the greater weight which this entails, you will note the very general adoption of six-wheel tender trucks.

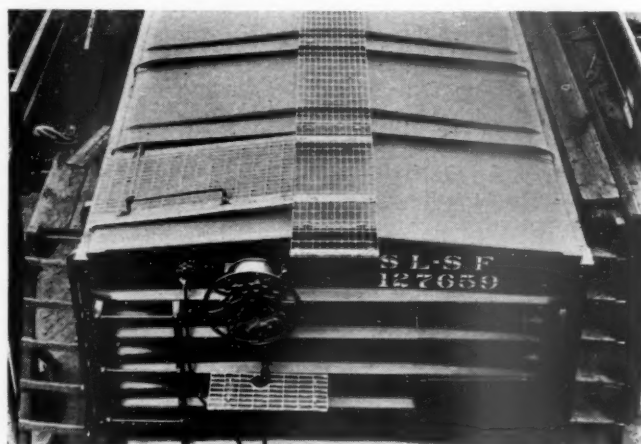
In addition to these general design trends we find many other items of detail design that are prompted largely by the desire to obtain reduced maintenance cost or greater operating efficiency or both of these objectives. Among these items we find: (1) The increased application of roller bearings. (2) The more extensive application of flexible staybolts. (3) The greater use of

higher-tensile boiler steel to effect a saving in weight. (4) The use of heat-treated main and side rods to effect weight saving and to give better counterbalance conditions. (5) Greater adherence to standards in general use on the railroad for which the locomotives are being built. (6) More careful inspection to secure better workmanship and eliminate minor defects which may eventually cause progressive fractures. (7) The more extensive use of mechanical lubricators and the increased number of outlets, providing positive lubrication to parts and surfaces heretofore less definitely protected.

Apex Safety-Steel Running Board

A NEW type of metal running board for all kinds of box cars, as well as running boards for locomotives and locomotive tenders, has recently been developed and placed on the market by the Apex Railway Products Company, Chicago, Ill.

This running board is of the grating type with both the longitudinal and latitudinal bars serrated to assure



Apex Tri-Lok Running Board and Hand-Brake Step Applied to a Box Car

safe footing for trainmen and other employees, regardless of weather conditions. The running board utilizes the Tri-Lok method of fastening the bars together, the Apex Railway Products Company having been exclusively licensed by the Tri-Lok Company, Pittsburgh, Pa., to use this method of construction in making running boards for use on all railroad rolling stock.

In assembling, the bearing bars are set on edge with a series of J-slots uppermost and with these slots in adjacent bars curving alternately in opposite directions. Each bar is held in a rigid steel frame assuring accurate alignment. Cross bars of the same depth and width as the bearing-bar slots, are then forced into the slots under a 1,600-ton press. This completes the triple twist-and-turn lock from which the name Tri-lock is derived.

The Tri-Lok bearing bars are not punched or cut below the neutral axis, so that the strength of the lower or tension side is unimpaired. The wedge action from forcing the cross bars into the curved locking slots is said to increase the strength of the upper or compression side and hence make the load-carrying capacity of the bearing bars greater than that of corresponding solid bars.

The cross bars are of sufficient depth to eliminate lat-

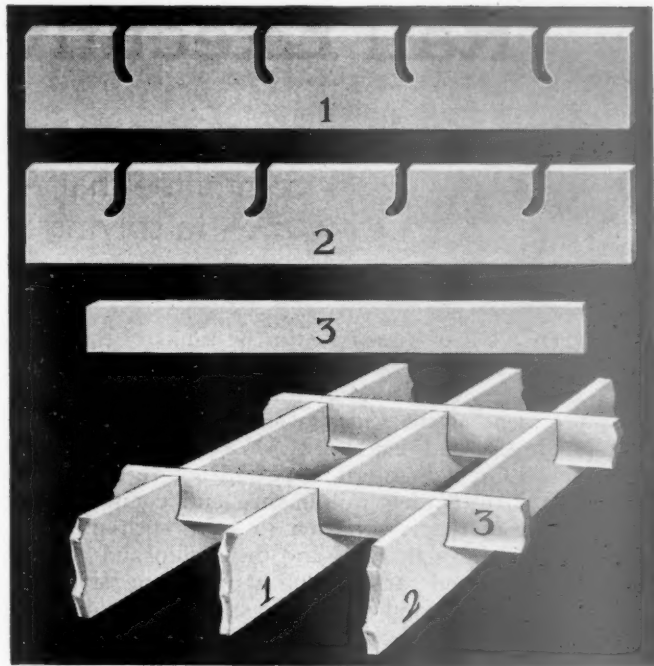
eral deflection of the bearing bars and, because of the rigid lock at the joint, they act also as cross braces giving an even distribution of a concentrated load over a wide panel. The rigidity of this construction permits the use of light sections, with the result that this metal running board is, in certain cases, even lighter than the standard wooden running board.

The material is made of 0.25-per cent carbon, copper-bearing steel and the separate units which make up the complete running board are hot-dipped galvanized after the entire assembly has been completed. It is estimated that this running board will last the life of the car without maintenance costs of any kind.

The serrated top surface of this running board presents a safe walking surface regardless of weather conditions. The serrations are sufficiently sharp to crush sleet or ice under a man's weight, and the spacing between the bars is sufficient to furnish an available hand hold in case of emergency. It is likewise claimed that this running board will be self-cleaning due to the fact that it presents a 90 per cent open area. Under ordinary conditions it will be impossible for snow to collect to a sufficient depth to cover the serrated walking surface.

The Apex Tri-Lok running board consists of seven sections on a standard 40 ft. car. The five center sections are approximately 81 in. long and are spaced $\frac{1}{4}$ in. apart. The end sections vary according to the exact dimensions of the car and are purposely kept smaller to insure lower replacement costs in the event that the car is cornered in service.

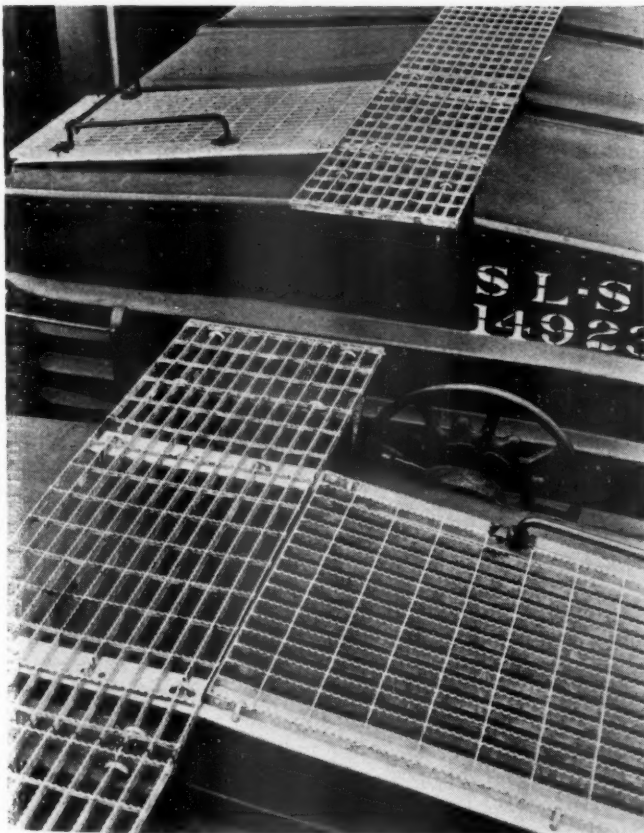
The sections can be attached to the standard saddles now in use and the method of fastening will make possible the use of standard A. A. R. $\frac{3}{8}$ -in. bolts or rivets. The application of this type of running board entails the use of 63 standard $\frac{3}{8}$ -in. bolts complete with lock



Principle of Construction of the Apex Tri-Lok Running Board

nuts as compared to 90 $\frac{3}{8}$ -in. by $1\frac{1}{4}$ -in. water-tight, slotted head bolts and 12 $\frac{3}{8}$ -in. by 2-in. water-tight, slotted head bolts used on the wooden running board.

Latitudinal or transverse running boards and hand-brake steps or platforms, are also furnished by the Apex Railway Products Company in the same general type of design.



Details of Application—Note the Serrated Top Surfaces

Photographing Waybills

A DEVICE for photographing waybills, first used as an emergency measure at Potomac Yards, Va., by the Richmond, Fredericksburg & Potomac, has proved of such value as to justify its continuance under normal operations.

During the flood period of January, 1937, the yard office was suddenly called upon to supply a large amount of unusual information from waybills to the accounting departments of various railways. With the Ohio river gateways badly handicapped by flood conditions, a large volume of business was detoured via Potomac Yards, and the traffic handled there jumped from an average of 3,000 cars per day to 6,000 cars per day, almost without warning. Much information was required by the accounting and traffic departments regarding such detoured cars and it was apparent that, under the unusual circumstances prevailing, the added paper work would cause serious delays to the movement of the cars.

In the emergency, it was decided to try a Recordak machine, much used by banks for photographing checks and other records, to photograph the waybills, so that paper work would not delay the yard operation, and the necessary information could be taken from the photo of the waybill, the waybill itself to go forward in the regular manner. This emergency installation gave such excellent results that it has since been maintained for regular service.

Potomac yard is owned and operated by the Richmond, Fredericksburg & Potomac, and is the interchange point as between the Baltimore & Ohio and the Pennsylv-

(Continued on page 501)

Rail Executives Hit A. A. R.

Sargent, Joyce and Walter complain to Wheeler
committee that Association has "failed"
in solving major problems

WASHINGTON, D. C.

EVIDENCE of dissension in the ranks of the members of the Association of American Railroads came to light on March 16 when Fred W. Sargent, president of the Chicago & North Western, Patrick H. Joyce, and Luther M. Walter, co-trustees of the Chicago Great Western, appeared before the Senate committee investigating rail finance and complained of the inability of the Association to solve such problems as division of through rates and ownership and charges for privately-owned cars. Sitting at the same table with President Sargent and Co-trustees Walter and Joyce was President John J. Pelley, of the A. A. R. who attempted to justify the record of his organization, pointing out to the committee that "our concern is more with the saving of money than it is with the solving of disputes between carriers."

Not only did Mr. Sargent criticize certain roads, including the Union Pacific, the Northern Pacific, Chicago, Milwaukee, St. Paul & Pacific, and the Great Northern, for the divisions they take of through rates from the Pacific Coast to Chicago and beyond, but he went so far as to suggest a comprehensive legislative program which, in his opinion, is the only thing that will keep the railroads out of government ownership. Highpoints of his program included such recommendations as giving Congress power to require coordination and pooling, revising working schedules with the Brotherhoods, eliminating all free transportation except those employees actually on duty or going to or from work, setting up a federal board to take over all rail financing at government interest rates, requiring the Interstate Commerce Commission to re-examine divisions of through joint rates, repealing the requirements for reductions in rates because of land grant provisions, amending the Motor Carrier Act so as to permit the carriers to engage freely in that type of operations, requiring the commission to re-examine the charges for private cars.

Sargent Criticizes Eastern Carriers

Senator Truman started off the session by stating that the object of the committee was to find out whether or not these railroads in the Mississippi valley, most of whom are now in receivership, are getting a fair share of division of joint through rates from the Pacific Coast to eastern points. After explaining that the Eastern carriers get 27½ per cent of the rate on any through traffic originating west of Chicago, Mr. Sargent went on to say that these carriers are "unfair" in their refusal to participate in reductions in the rates from Chicago east. He then told the committee how his road and the Chicago Great Western had repeatedly tried to get reductions in certain commodities but that every time the Eastern carriers had refused to reduce their charges with the result that the market on the Atlantic Coast for certain commodities was definitely closed to certain middle-west producers. He also felt that the divisions

in the joint through rates with such carriers as the Union Pacific, Northern Pacific, Great Northern and the Milwaukee were "decidedly unfair." He pointed out to the committee that despite the fact that the North Western has 22½ per cent of the rail mileage haul from the Pacific Coast to Chicago, yet his road receives only 16½ per cent of the joint through rate. Mr. Joyce agreed that this situation also obtained in the case of his road.

Senator Truman wanted to know whether or not the effects of these "unjust" divisions had affected the bankruptcy of both roads. Both Mr. Sargent and Mr. Joyce agreed that they were certainly factors in the situation. At this point Mr. Joyce asserted that the money "lost from unfair divisions over a period of 40 years would have been enough to have kept the Great Western out of receivership."

Roads Fear Union Pacific

Continuing on the subject of divisions, counsel for the committee revealed that the Union Pacific owned 31 per cent of the voting stock of the Illinois Central. Several years ago, said Mr. Sargent, the Western Trunk Line carriers agreed to ask the commission for a hearing on the question of divisions, but at the last minute, the Illinois Central decided to withdraw from the joint appeal, with the result that the other carriers did not dare to go through with the case for fear that the Union Pacific would divert its entire through traffic to the Illinois Central. He admitted to Senator Truman that the real reason that his road and other carriers in that territory had not pressed this case lay in the fact that they were fearful that they would lose all their through traffic.

At this point, the question arose as to why the A. A. R. was not meeting such problems as divisions, and committee counsel introduced exhibits which showed that the Association was formed to promote the interests of the industry and solve just such questions. President Sargent did not feel that the A. A. R. could be used as a means of arbitrating such a controversy as divisions. Pressed for a reason for his opinion, he told the committee that its board of directors is made up of representatives of the boards of directors of the carriers which are members of the Association. He went on to say that no carrier in the Western Trunk Line territory had a board of directors, some members of which did not sit on the board of the larger carriers who are exacting the "unfair" divisions from the North Western and the Great Western. He felt that no board of directors of a carrier in Western Trunk Line territory solely represented that carrier. As a result they neither would allow a divisions case to arise, or could fairly arbitrate it if one were to arise.

Just as Mr. Sargent was making his criticism of the A. A. R., Mr. Joyce interrupted to say that the Chicago Great Western had asked for a hearing on divisions, but that "someone" had adjourned the meeting of the

A. A. R. without giving him a chance to be heard. He could not be prevailed upon to identify the "someone." Mr. Joyce also wanted to impress upon the committee the fact that "the question of divisions is one of our biggest problems."

Voting By Mileage Basis Hit

Senator Truman led off on a discussion of the faults of the A. A. R. by asking the witnesses whether or not the trouble with the Association lies in the fact that the roads vote on a mileage basis. Both executives agreed to this criticism, pointing out that such roads as the Pennsylvania and the Union Pacific literally dominated the Association.

The chairman then called President Pelley to the stand. He was asked what he thought of the criticism that the Association had "failed" in its efforts to solve this problem of divisions. Mr. Pelley did not feel that the Association had been set up to solve such problems, but rather, it was more concerned with effecting economies which would save the industry money. He also felt that the A. A. R. was not a fair place to bring up the subject of divisions and went on to say that probably "it is a problem that must ultimately be settled by the commission." President Sargent would have the commission, on its own motion, take up the whole subject of divisions in the Western Trunk Line territory.

Joyce Presents Gloomy Picture

Moving on from the subject of division to the question of the financial condition of the carriers in the country, Mr. Joyce presented an exceedingly pessimistic picture to members of the committee. According to the witness, there was never a time in railroad history when the condition of the carriers was as acute as it is today. He then went on to say that thousands of vouchers are being pigeon-holed by roads all over the country in an effort to conserve cash. He predicted that when the carrier executives see their February balance sheets, even the stoutest-hearted among them will quake with fear. Max Lowenthal, counsel for the committee, asked Mr. Joyce whether he meant that such roads as the Union Pacific and the Pennsylvania would not be able to pay their bills. He replied that even such roads as these would not make enough during February to pay their taxes and wages of their employees.

Mr. Sargent's Plan

At this stage of the hearing Mr. Sargent asked permission to read a prepared statement in which he outlined what he believes to be "measures that should be taken to help the railroads in their present critical condition." He added that they should be adopted at once. The text of his recommendations follows:

1. Congress should invest the Interstate Commerce Commission with power, or, if it desired, create a separate board and invest it with power to require coordination and pooling where the same will produce efficiency and economies and not injure the public service, and should also clothe the Commission or such board with power to revise working schedules with the brotherhood organizations to the end that many of the costly changes made in recent years by decisions of the adjustment boards may be corrected. It is estimated that as a result of the inability of the railroads to obtain eight hours work for eight hours pay, 25 per cent of their wage bill is non-productive.
2. Congress should prohibit all free transportation, except to employees actually on duty or going to or from work.
3. Congress should make possible the financing of railroads from this time forward, both for purposes of reorganization and

for present and future capital requirements, by an agency of the federal government, such as the Reconstruction Finance Corporation, at rates of interest no greater than the government itself has to pay, plus a reasonable charge for administrative purposes.

4. Congress should by resolution direct the Interstate Commerce Commission to reexamine the subject of divisions of through joint rates with a view of relief to those regions in greatest financial distress.

5. Congress should repeal the requirements for reductions in rates because of land grant provisions.

6. The Motor Vehicle Act should be amended so as to enable railroads to engage in the motor vehicle business without the restrictions now imposed under the decision of the Commission in the so-called Barker Case.

7. The Interstate Commerce Commission on its own motion should reexamine mileage rates paid for use of private cars, which we believe would result in a reduction in these rates and material savings to the carriers.

8. It should be provided that hereafter contracts between carriers for divisions of through joint rates can only be made after first securing the approval of the Commission to the terms of such contracts, and, likewise, it should be provided that contracts for the use of special equipment, including sleeping cars, parlor cars, etc., should not become effective except upon approval of the Commission.

The foregoing should be made effective as early as possible, but this program should be followed by a long-range program which would involve the following principles:

1. A board should be created that would have power to bring about the consolidation of all railroads in the country into a few transcontinental systems; this in the interest of national defense as well as the national public welfare.

2. A permanent and firm rate-making policy should be established, taking as the guiding principle that it is the duty of the government, since it has assumed the power to regulate, that it do so in a manner that will enable the railroads to support the required capital structure looking to the proper maintenance and operation of the properties.

3. A permanent labor policy should be declared, in which the following principles should be embodied:

That service for a common carrier is service for the public, and that when such service is accepted the right to strike against the public welfare is left behind, and in lieu thereof the government should create a permanent and impartial board that will have full power to fix working rules and conditions and rates of pay, the board to be permanent in character, serving during good behavior, with the positive duty to keep and make complete records of every case coming before it, and rendering opinions with reasons therefor, all of which should be made permanent records of the board relating to its conclusions in all controversial matters, and in this manner to also have a continuity of opinions and decisions.

4. A permanent policy whereby the government would do the financing for the railroads on the ground that they are a permanent instrumentality for the preservation of order and peace and the national defense, such financing to be done at rates not to exceed the cost which the government has to pay for money, plus a reasonable rate to cover administrative costs and other incidental expenses and losses, this provision not to apply where financing can be accomplished by the issuance and sale of stock.

5. The government should provide for federal incorporation of railroads, especially those undergoing reorganization, and should invest the Interstate Commerce Commission with the duty of bringing about consolidations where two or more companies are being reorganized, when such consolidations would improve the value of the securities and help establish a sounder capital structure, and at the same time render efficient service to the public.

6. Congress should withdraw from the States the power to fix rates affecting carriers engaged in interstate commerce.

Conclusions

Having suggested the foregoing as remedial measures, it is nevertheless necessary to state that all of said measures combined will not act promptly enough to tide many of the carriers over the present crisis with which they are now confronted. It was established beyond peradventure in the Advance Rate

Case that it would require a 15 per cent increase in freight rates to meet just and only the increased costs and expenses imposed upon the carriers during the past year. I understand it to be the general public policy of the government to frown upon any reduction in wage rates. Since the government is against allowing any further increases in freight rates, as evidenced by the recent decision of the Commission, and since most of the railroads have exhausted their reserves and many are without funds to meet the increased costs of operation and maintenance during the present emergency, which we hope, at least, is temporary, it, therefore, seems appropriate at this time that Congress should immediately empower and direct the Reconstruction Finance Corporation to make loans to railroads upon their promissory notes and without security, at low rates of interest, in those cases and under circumstances where it can be shown that such loans are necessary to the proper maintenance of way, structures and equipment, all in the interest of the public service, the transportation of the mails, the preservation of order and peace, and for the national defense.

During his discussion of a new government financing agency, Mr. Sargent added that "there is no way out except government ownership if we continue as we are now going." On the subject of private cars, he accused the A. A. R. board of directors of "walking out" on him when he was discussing the subject of private car rentals. He also criticized the Pullman Company for some of its present contracts with the railroads, pointing out that in the case of the operation of Streamliners on his own road in conjunction with the Union Pacific and the Southern Pacific, the Pullman Company had decided to raise the yearly rental of Pullman cars on the new trains by \$2,000 a car because, they said, they had a greater investment in the new equipment. Why should the Pullman Company, he continued, be permitted to charge a higher rental for new equipment when the carriers were not permitted to charge a higher passenger rate for their new streamline passenger cars? He believes that the commission should be given supervision of the contracts that the Pullman Company makes with the carriers.

He also told the committee that it was his belief that the A. A. R. should have taken up this subject of Pullman car rentals, but the real reason that they had done nothing about it lay in the fact that the Pullman Company was a prominent member of the A. A. R. Mr. Lowenthal wanted to know whether or not the Justice Department had ever looked into the question of whether the Pullman Company had violated the Sherman and Clayton acts by virtue of the fact that they have a monopoly of the sleeping car business. Co-trustee Walter brought this phase of the discussion to an end by observing that he would be in favor of having the I. C. C. examine all contracts of the railroads for purchases of rails. Mr. Joyce and Mr. Sargent acquiesced.

Walter on Divisions and Pooling

At the resumption of hearings in the afternoon, Mr. Walter was asked if he had anything further to say on the subject of divisions. He said that there was need for legislation which will allow the commission to force redistribution of earnings of the strong carriers without consent of all the carriers. He pointed out that in the recent Ex Parte 123 rate advance case, he had advocated a pooling plan whereby the stronger roads would pool their increased earnings and give them to the weaker roads. He added that because the commission cannot force pooling without the consent of all the participating carriers, it has naturally been hesitant to raise the rates high enough to allow the weak carriers to make enough to keep them from or bring them out of bankruptcy for the reason that the present strong carriers will make much more than enough to earn a fair return

on their investment. Senator Truman remarked that "pooling of revenues looks like common sense to me."

Mr. Walter also served notice on the industry that his road was going to immediately file a complaint with the Interstate Commerce Commission asking that it investigate the subject of divisions and also that of the rental of private cars. Mr. Walter also said that his company expected the other carriers in Western Trunk Line territory to go along with his forthcoming complaint to the commission on divisions. He also complained of the action of wage adjustment boards under the Railway Labor Act and demanded that Congress do "something" about righting the abuses that now exist. He believes that the same board of the government that fixes the rates of the carriers should have the power to fix the wages so that the two could be more nearly brought into line.

Mr. Walter and Mr. Joyce were asked what they thought about the feasibility of a central purchasing agency for the railroads. Mr. Walter agreed that it might have many advantages, but Mr. Joyce took the opposite view, saying that he felt that such a device would stifle progress in the industry.

Private Car Charges Hit

The session was concluded with an examination of one of the private car companies, the Pacific Fruit Express, which is owned jointly by the Union Pacific and the Southern Pacific. A committee exhibit showed that the P. F. E. made \$51,121,340 for the Southern Pacific in the seven year period from 1930-1936, and \$43,518,060 for the Union Pacific for the same period on an investment for each carrier of \$12,000,000. The exhibit also showed that the percentage of net income of the Union Pacific which was attributable to P. F. E. dividends for this period varied from a low of 9 per cent to a high of 39 per cent; while in the case of the Southern Pacific, it varied from a low of 9 per cent to a high of 65 per cent.

During the discussion it was brought out that the refrigerator car companies charge the carriers two cents a mile for every mile that the carriers haul the refrigerator cars. It was also brought out that in 1934 the A. A. R. had examined the charges for rental of refrigerator cars and had come to the conclusion that two cents a mile was not unreasonable. "Where the railroads get any formula which justifies a two cent a mile rate, I don't know," remarked Mr. Sargent. President Pelley said that he had no objection to a reexamination of refrigerator car charges.

Joyce Charges Long Routing

Mr. Joyce charged that the refrigerator cars were routed "all around Robin Hood's barn" because by so doing, they earned more money for their owners. He told of a case on his line where a train-load of empties was first routed from Chicago to Omaha and thence to Minneapolis, making a total journey of about 900 miles when they could have been directly routed to Minneapolis from Chicago, a 400 mile trip.

Mr. Sargent told the committee that he favored the ownership of all refrigerator and tank cars by some organization such as the A. A. R., so that they could be used by all the roads on the same basis. He said that he felt the A. A. R. had failed in either its lack of ability or its lack of desire to do anything about this problem.

The committee adjourned, subject to the call of the chairman, and it was learned that the next witness would be Fairman R. Dick, financial adviser to the A. A. R.

Hearing on Pettengill Bill

Testimony of opponents, who have line-up of 70 witnesses, gets under way

WASHINGTON, D. C.

PETTENGILL bill opponents launched their attack on that measure, which would repeal the long-and-short-haul clause of the Interstate Commerce Act's fourth section, at this week's sessions of hearings before the Senate committee on interstate commerce. Disclaiming any intention to filibuster, they nevertheless said that co-ordinating efforts had thus far resulted only in a cutting of their witness list from 105 to 70.

The liveliest session of the hearing thus far came on March 15 when W. H. Chandler, manager of the Traffic Bureau, Merchants' Association of New York, was testifying as the second opposition witness. Mr. Chandler's attempt to answer testimony of proponent witnesses brought from Senator Bone of Washington a declamation on the committee's difficulty in knowing what the truth is when there is so much calling of names. Also, the witness' presentation reminded Senator Schwartz of Wyoming, who was presiding, of an "old courtroom maxim." As recited by Senator Schwartz the maxim advised lawyers somewhat as follows: If the facts are on your side, present the facts; if you do not have the facts and the law is with you, argue the law; if you do not have the facts and the law isn't with you, give the other fellow hell. Senator Schwartz had previously told Mr. Chandler that the committee would prefer his "informed and competent" opinion instead of the quotations from others which the witness was putting into the record.

No "Sense of Justice" in Water Carrier Subsidizing

At another point Senator Dieterich of Illinois listed government expenditures to aid water transportation and asked the witness if there is "any sense of justice" in such "discrimination against an institution" which builds its own right-of-way, provides its own signaling and other aids to safety, and pays its taxes. The waterway expenditures, Mr. Chandler said, were a matter of government policy; and he thinks that if they are to be made the facilities they create should be used. He believes there is much to be said in favor of placing tolls on inland waterways, but does not agree that government expenditures on aids to ocean navigation set up a parallel case.

A highlight of the testimony of the final witness for the proponents—C. E. Hochstedler, traffic director of the Chicago Association of Commerce and former Western traffic assistant to the Federal Co-ordinator of Transportation—was his account of how the United States government has no truck with adherence to the long-and-short-haul principle when it is in the railroad business. He told how the government-owned Alaska Railroad resolved one of its difficulties in that connection in an arbitrary manner which, he said, might well become the fashion under federal operation of the railroads in this country.

Testimony in support of the bill, subsequent to that reported in the *Railway Age* of March 12, included that of Western iron and steel manufacturers and sugar beet

producers. Appearances for those interests were made by Robert Hula, general manager of Clayton Mark & Company, Chicago; and L. P. Siddons, traffic manager of the Holly Sugar Corporation, Colorado Springs, Colo. Next in turn came F. B. McElroy, transportation rate expert of the Illinois Commerce Commission; John B. Keeler, assistant general traffic manager of the Koppers Company, who appeared also for the Pittsburgh, Pa., Chamber of Commerce and various wood preserving companies; and Samuel H. Williams, manager of the Transportation and Foreign Trade Bureau, Philadelphia, Pa., Chamber of Commerce. Also, W. D. Johnson, vice-president and national legislative representative of the Order of Railway Conductors, who returned to the stand at the request of George M. Harrison, chairman of the Railway Labor Executives' Association, to read the latter's statement in support of the bill.

Mr. Hochstedler explained at the outset how one in his position must recognize the need for all transportation agencies, and thus he was not before the committee to favor the railroads as against their competitors. He was merely advocating a set-up which would give to shippers the greatest possible service from each agency in its proper sphere.

Proceeding to tell his story about the Alaska Railroad Mr. Hochstedler explained that the road connects at Seward with the Alaska Steamship Company with which through joint rates are published between Seattle, Wash., and Tacoma, and rail-line points beyond Seward. At one of those points—Anchorage—there is direct water competition from Seattle and Tacoma during the season of open navigation. Effective April 5, 1936, the witness went on, the Alaska Railroad published joint through charges on beer in carloads of \$336 per car from Seattle to the first group of stations beyond Seward; \$378 per car to a second group of stations; and so on up to the \$476 rate to Anchorage. Within a week, by a tariff issued April 10, 1936, effective April 12, 1936, and received by the Interstate Commerce Commission on April 14, 1936, according to the files of the regulatory body, the \$476 rate to Anchorage was cut to \$289.50, with the stipulation that the lower charge would apply only on beer originating at Seattle. This, Mr. Hochstedler calculated to be a 39 per cent reduction "of which the public apparently had no knowledge until two days after it became effective." A little over a month later, on May 30, 1936, rates to all intermediate stations were increased; and when the ice had closed the competitive water route, by October 17, 1936, the charge to Anchorage was not only restored but was increased to \$512. The latter the witness figured to be an increase of 77 per cent over the water-competitive rate.

Government Road Establishes Rates and Files Tariff Two Days Later

Senator Schwartz, of Wyoming, asked about the reason given by the Alaska Railroad for the May 30, 1936, increase in the rates to intermediate points between

Seward and Anchorage; and Mr. Hochstedler replied that the government road apparently did not have to give any reason. Asked by Senator Minton if the Alaska were under I. C. C. regulation the witness replied that as yet he had been unable to develop much on that point—the member of the I. C. C. staff to whom he was referred had thus far been unable to confer with him. However, he went on, the Alaska files its tariffs with the I. C. C., and such tariffs carry an I. C. C. number; yet “the fact remains” that the commission received the beer tariff “two days after it had been made effective without short-notice permission.” Thus it was Mr. Hochstedler’s present view that if the I. C. C. has regulatory authority over the Alaska “they are apparently not exercising it.”

Furthermore, the witness added, the I. C. C. places in every fourth-section order the stipulation that the rates to intermediate points shall not exceed the lowest combination available to such points by way of the more distant point to which a fourth-section relief rate is allowed. In the Alaska set-up, however, beer could be shipped through an intermediate point which Mr. Hochstedler took as his example to Anchorage and consigned back to that intermediate point for combined charges of \$359 a car as compared with charges of \$456 a car on direct billings to the intermediate point. Senator Minton asked if the point in citing the Alaska case were to show that when the government is in the railroad business, it doesn’t bind itself to any fourth section.

Mr. Hochstedler agreed that the Senator had cited one of the principal reasons for the testimony; another purpose was to illustrate what the shippers may expect should the government take over the railroads here—they will find that rates are published two days after they become effective.”

Only 2 Out of 100 Applications Protested

Asked what proportion of the applications for fourth-section relief is protested, Mr. Hochstedler referred first to I. C. Commissioner Eastman’s statement at House hearings on the bill. There, the witness said, Mr. Eastman answered that since the I. C. C. is authorized to represent the public, all applications could be considered as protested. Mr. Hochstedler did not, however, agree with that—the commission, he said, is not authorized to represent the Chicago Association of Commerce; and he went on to quote figures indicating that only about two out of 100 fourth-section applications draw formal protests.

Asked by Senator Davis of Pennsylvania what the Congress might best do at this time to help the railroads, the witness replied that a good start would be long-and-short-haul clause repeal, which would give railroad management a chance to see what it could do. Senator Shipstead could not understand how so much complaining could arise from the administration of the fourth section by the I. C. C., which “is generally regarded as friendly to the railroads.” Mr. Hochstedler did not think that railroad officers generally would agree with the latter. He added, however, that he thought the regulatory body was sincerely trying to do its duty as it saw it under the present law; and Senator Schwartz recalled that every witness for the proponents “has said that.”

In concluding Mr. Hochstedler pointed out that while the shipper proponents had only 10 witnesses, they could have “brought enough to keep you in session a year.” He was, however, in accord with Chairman Wheeler’s opening statement that the bill should be brought before the Senate at the current session; and thus he hoped that

the opposition would be “as considerate in avoiding duplication.”

Filibuster Seen in Opposition Program

J. M. Souby, assistant general counsel of the Association of American Railroads, came forward to announce that the railroads had concluded their presentation, except for a statement which they wished to file, listing various organizations which have passed resolutions supporting the bill. Also, he added, the carriers might want a little time for rebuttal at the conclusion of the opponents’ presentation. The latter brought from Senator Minton the prediction that “we’ll get into a filibuster if we don’t look out.” The opponents, the Senator went on, “say they have 100 witnesses, but I don’t want to listen to 100.” Thus Mr. Minton thought that 20 hours—the amount of time taken by proponents—should be enough for the opponents.

This brought a protest from former I. C. Commissioner Johnston B. Campbell, counsel for the Intermediate Rate Association and chairman of the opposition’s steering committee, who said that it would be impossible for the opposition to concentrate its testimony as the railroads have done. Witnesses “from all parts of the country” have asked to be heard. Included among them, Mr. Campbell said, are shippers, state commissions, sectional organizations, water lines and the trucking industry. He added that the importance of the bill to the shippers is such that it would not be possible to complete the opposition testimony in “anything like” 20 hours—120 hours would be more like it. When Senator Minton said he wasn’t “going to sit here 120 hours,” Mr. Campbell thought “we may be able to cut it a little;” and Mr. Minton retorted “You’ll cut it a lot as far as I’m concerned.”

Senator Johnson of Colorado called attention to the recent statement of Congressional leaders to the effect that adjournment of the session within 60 days would be sought. He calculated that 120 hours at two hours a day (the length of sessions during the presentation of proponents) would amount to 60 days. Thus it looked like a filibuster to Mr. Johnson, and he went on to suggest daily sessions of 10 hours “to clean it up.” Mr. Campbell assured the committee that his plans contemplated no filibuster, and went on to say that the railroads are seeking to do something they haven’t been able to do for 50 years. Whereupon Senator Minton said “if we sat here 120 hours—assuming we’d be silly enough to do it—there would be about 80 hours of repetition.” Mr. Campbell still protested that the opponents were not given a full hearing before the House Committee, and Senator Minton still insisted that the committee should start the opposition on the basis of a 20-hour allotment of time.

May Hold Evening Sessions

The question remained unsettled when the opposition opened its presentation this week with Chairman Wheeler presiding for a short while at the March 14 session. He stated that the committee wanted everyone to be heard that can be heard, and thought that it might be necessary to hold some afternoon and Saturday sessions, and perhaps some evening meetings. In that connection the chairman went on to reiterate his statement at the opening session to the effect that he wanted the committee to have an opportunity to vote on the bill, and the Senate to take it up at the current session. Later Senator Wheeler said that neither he nor the committee wanted to be put in the position of permitting a filibuster on the

bill. Mr. Campbell replied that the opposition had cut its witnesses from 105 to 70, and that it will do everything possible to expedite the proceedings. Here the chairman read a long list of senators and representatives who had requested that interests from their respective states be heard.

The first opposition witness was C. E. Childe, of Omaha, Nebr., chairman of the traffic committee of the Mississippi Valley Association. He described that association as a voluntary organization of shippers and others in 22 states from Pennsylvania on the east to Montana on the west; and from North Dakota to Louisiana. Its object is to promote the commerce of the interior. Mr. Childe did not agree with testimony of proponents holding that repeal would benefit railroad revenues, their employees or increase the taxes they pay in the several states. He calculated the total amount of competitive water-borne tonnage—inland waterways, intercoastal and Great Lakes—at 10,000,000 tons a year, or about one per cent of the total tonnage handled by railroads. If the railroads got all this tonnage and collected on it their average revenue of about \$3 per ton, Mr. Childe went on, their annual revenue would be augmented by \$30,000,000 or an amount equal to one-tenth of one per cent of the railroad gross.

Thus the witness thought that the only result of long-and-short-haul clause repeal would be railway rates below cost. But Senator Minton reminded him that the I. C. C. could stop that under its minimum rate powers and went on to ask if Mr. Childe favored the regulation of water carriers. The witness thought the water lines were regulated "to a large extent;" but Senator Minton thought it was "to a very small extent." Senator Minton next asked if the witness objected to the railroads applying for fourth section relief. Mr. Childe did not under the present set-up, but he thought repeal would produce rate wars and further discriminations. He would not agree with Mr. Minton that the bill does nothing but alter procedures, and he told Senator Schwartz that the situation would not be improved through regulation of all transport agencies by the same commission.

Minton Sees Needless "Rigmarole"

As Senator Minton saw it the only change repeal would bring would be that the railroads could propose a rate, subject to suspension, before getting permission to depart from the long-and-short-haul principle; now they must get the permission first. He cited previous testimony to the effect that only about two out of 100 applications for relief are protested, and wondered why "all the rigmarole" was necessary when no one was objecting in most cases. Mr. Childe thought the post-repeal set-up would involve more "rigmarole" in a protested case, because the railroads would have to prepare the tariff in the first instance; now they prepare only the application.

The witness also referred to the tariff exhibit introduced by Chairman J. G. Kerr of the Southern Freight Association, which "almost sold" Senator Minton on the virtues of the bill. The routing instructions which, Mr. Kerr said, required the preparation of the voluminous tariff, Mr. Childe said were necessary to deal with the circuitry provisions; they did not deal with rates. He added that there are 1,000 different rail routes between Chicago and Savannah, Ga., and he hopes the I. C. C. will offer some evidence on "wasteful" rail routes. At another point Mr. Childe told Senator Minton that the railroad contention that only procedure is involved does not make sense in view of the determined opposition the proposal has aroused; but Senator Minton thought it

might be that "the railroads are in the toils and their competitors want to keep them there. The witness thought the solution of the interior's problem was the development of "cheap" inland waterway transportation and its maximum utilization in a set-up of joint rail-water rates. His "fundamental difference of opinion" with the proponents is based on what he interpreted to be the latter's economic philosophy of maintaining discriminatory rates as against "equality of transportation opportunity" throughout the country.

Trucker on Traffic Committee Where Railroad Men Can't Be Trusted

In addition to the Merchants' Association of New York, Mr. Chandler spoke for the Shippers Conference of Greater New York and the New England Traffic League. He told Senator Schwartz that no railroad members of the Merchants' Association are represented on its traffic committee, because no railroad man "could be honest with his job" and serve impartially on such a committee. Senator Minton, however, brought out that the committee had a representative of the trucking industry—a local trucker, Mr. Chandler explained. The witness pointed out that the railroad members of the Merchants' Association were in favor of the bill, but he nevertheless said he voiced the opposition of the majority of the membership.

Like Mr. Childe, Mr. Chandler referred to the 1,000 rail routes between Chicago and Savannah, calling indirect routes "pretty cute things for the fellow that's got a tank car on which he's collecting rentals on a mileage basis." Such a shipper, Mr. Chandler charged, will route his freight "all around Robin Hood's barn" in order to increase rental payments. Turning to railroad employee support of the bill, the witness said that not one per cent of the workers "have any conception of what the fourth section means." His prediction that repeal would not increase employment seemed to Senator Minton inconsistent with the witness' previous contention that the railroads would take all the business now handled by water lines.

Chandler On "Malicious" Plan

Senator Bone's above-mentioned declamation had its beginnings in his question asking if Mr. Chandler thought the railroads had a "malicious" plan. The witness had no doubt that it is the policy of railroads "to do away with water transportation if they can—that was the policy when I was in the business—there is no railroad in the United States that wouldn't sink a water line if it got a chance." Senator Bone referred to previous testimony on how the water lines were taking business from the railroads; and Mr. Chandler's reply that he had perhaps heard "more things that aren't true than anyone" started Senator Bone on his "what-are-we-to-believe" tack. Mr. Chandler asked him if he knew what happened to the water lines before 1910. The senator did, and he knew what happened "when the water lines got a chance to dip into the Treasury for a subsidy, and what the railroads did with the land grants"; but he still didn't know whom to believe in the present case.

Mr. Bone went on to refer to the proposal to subsidize intercoastal carriers, and wondered if they were going to get both the subsidy and increased rates. Mr. Chandler was not advocating the subsidy, and he denied Senator Bone's next assertion that he had instructions from water carriers in connection with his opposition to the bill—the Merchants' Association "is not the tail to any dog." Sen-

ator Minton helped the argument to an end by a series of questions which brought out that Mr. Chandler obtained his information about the hearing through correspondence with Chairman Wheeler, and was advised of the opponents schedule by the secretary of the Mr. Campbell's steering committee. Mr. Campbell said that he did not represent any steamship company.

Challenges N. I. T. League Showing

Much of Mr. Chandler's testimony was an attempt to show that the National Industrial Traffic League's support of the bill, which it calls its own, is not endorsed by that organization's membership in any such universal fashion as is claimed. His quotations of previous N. I. T. League pronouncements in defense of the fourth section were interrupted by Mr. Hochstedler who pointed out that the statements Mr. Chandler was using were made in opposition to legislation proposing a more rigid fourth section—not in connection with a proposal like the Pettengill bill. Mr. Chandler agreed, but nevertheless insisted that the language he was quoting "went to the principle of the fourth section"—and the position of the League was that the I. C. C. should remain the judge. The attempt to calculate what proportion of the League membership endorses its official position in favor of the bill brought from Senator Minton the warning that "we'll be here until the cows come home" if witnesses go into inter-organization fights. Mr. Chandler protested that the "other side" went into the League's position; and Senator Minton expressed his feeling that "we're trying to get the facts, not merely trying to sit here 120 hours."

Here came Senator Schwartz's above-mentioned suggestion that Mr. Chandler limit his quotations in favor of his own opinions. When the witness explained his testimony as an answer to the "propaganda" put in by proponents, the presiding senator thought that Mr. Chandler was "probably over-apprehensive of how much propaganda it takes to influence the Senate." Senator Minton referred to the plight of an Indianapolis, Ind., industry in its unsuccessful attempts to reach Pacific Coast markets, but Mr. Chandler held that the ability of manufacturers located at points served by water carriers to reach distant markets was based upon a geographical advantage. He thought that if it was fair for an Indianapolis industry to reach the coast it was fair for a New York industry to reach inter-mountain territory. But Senator Dieterich did not see why the railroads did not enjoy one of those "natural advantages" if they could carry interior products to coast points at compensatory rates. He went on to ask why steamship rates should be blanketed at all Atlantic and Gulf of Mexico ports—why the several ports on those coasts were not accorded the benefits of their geographical locations. Mr. Chandler replied that steamship rates were always thus blanketed, and Senator Dieterich thought that the subject was "getting so complicated that I won't be able to understand it at all."

On "Cheap" Water Transportation

When the witness later suggested that water transportation is "cheaper" because water carriers have no right-of-way to maintain, Senator Dieterich asked if Mr. Chandler knew how much it costs to maintain channels and locks on inland waterways, how much it costs to maintain aids to navigation, and how much it cost to build the Panama canal. The witness replied by asking if there were any government which didn't do such things, whereupon Mr. Dieterich put his above-men-

tioned question on the justice of present discriminations against the railroads.

Senator Schwartz suggested that either there should be tolls on inland waterways or the government should pay for railroad rights-of-way. He added that if the country got into a major war in the Pacific, the railroads would be of more help than the water lines. Senator Dieterich followed through with citations of the "hundreds of millions" spent on waterways, permitting an industry located thereon to send products down to the Gulf and around to the West coast at rates cheaper than are available to "Senator Minton's Indianapolis industry." Under such circumstances, Mr. Dieterich could not understand why inland industries should not enjoy "natural advantages" arising from their railroad service.

Mr. Chandler again agreed that there is much to be said for tolls on inland waterways, but added that the calculation in connection therewith should allow for flood-control and power-development expenditures. The latter, he went on, often come "under the guise" of transportation, as in the St. Lawrence case where the transportation arguments are "a lot of hooley."

North Dakota Commission Objects

At the March 16 session, with Senator Bone presiding, the opposition testimony of North Dakota's Railroad Commission was heard. Witnesses were Elmer W. Cart, a member of that commission, and J. C. Winter, attorney in charge of its Traffic division. Mr. Cart contended that repeal of the long-and-short-haul clause would be harmful to North Dakota because he believed that the railroads would publish non-compensatory competitive rates, and shift the burden back onto interior communities. He agreed with Senator Minton that his argument would fall if it were shown that the railroads would not put in non-compensatory rates.

When Mr. Cart spoke of the relatively small amount of traffic handled by inter-coastal water carriers, Senator Bone wanted to know if the committee is to believe that "men running the railroads for 100 years are so utterly dumb" as to go after something that means very little to them. He thought there must be "something screwy about this picture." The witness replied that in his opinion the real force behind the bill is the desire of large industrial cities to be in a position to demand any rates they want to all points in the country. Told by Senator Minton of the Fargo (N. D.) Chamber of Commerce's support of the bill, Mr. Cart did not believe members of that organization had thought the matter through. Whereupon Senator Bone remarked that "if it is one-millionth as complicated as it is here they'd have to be Solomons to understand it."

Mr. Winter supplied the technical testimony in support of Mr. Cart's general presentation. The real basis of the railroad fault-finding, in Mr. Winter's opinion, has been the commission's definition of reasonably compensatory.

THE PERUVIAN CORPORATION, largest railway operator in Peru, is planning to operate motor rail-cars on all of its local and branch lines in northern Peru, according to consular reports. Experiments have already been carried out to determine the most suitable type of equipment, to ascertain the cost of operation, and to find out whether a frequent and more rapid service will bring about an increase in passenger traffic. The Peruvian Corporation is a British firm operating the Central and the Southern railway systems of Peru, with a total mileage of 794 miles. The company also operates a number of short narrow gage routes and branch lines.

Aftermath of Ex Parte 123

White House conference, wage-reduction move and tariff work on rate increases, which will be made effective on March 28

WASHINGTON, D. C.

THE long-heralded White House conference, railway management's initial move toward a wage adjustment, the labor executives' vote to fight any pay cut and the work of preparing tariffs to make the increased freight rates effective at the earliest possible date comprise the main outlines of Ex Parte 123's aftermath. The White House conference viewed the transportation problem as a dual one, having temporary and long-range aspects; and the President, agreeing that it is a transportation problem—not a railroad problem—did not know about Congressional action at this session. Meanwhile most of the new rates will be made effective March 28 as a result of short-cut tariff publishing methods worked out by rate experts, one of whom called Ex Parte 123's tie-in with Ex Parte 115 adjustments "the worst mess we've ever had."

Wage-Reduction Moves

The March 15 meeting of the White House conference, which was to convene again on March 17, was held four days after the March 11 meeting at which the Association of American Railroads board of directors voted to submit the question of wage reductions to the March 18 meeting of member roads in Chicago. The consensus of the White House conferees on the wage question was reported by Chairman W. M. W. Splawn of the Interstate Commerce Commission to be a feeling that the railroads at present should be able to earn enough to carry their employees "without wage reductions or lay-offs." Before going to the White House as one of the conferees, George M. Harrison, chairman of the Railway Labor Executives' Association, had announced that organization's vote to resist any pay cut.

"There is no justification for a reduction in wages," Mr. Harrison said. "The railroads got an increase in freight rates which more than compensates them for the wage increases granted us last Summer. There has been no change in general conditions that would warrant a reduction in wages. On behalf of all affiliated organizations I am authorized to state that they will vigorously resist any effort on the part of the railroads to cut wages."

White House Meeting a "Diagnostic Session"

I. C. C. Chairman Splawn, who had sent out the invitations to the White House conference, acted as its spokesman following the March 15 meeting. He characterized that initial get-together as "more of a diagnostic session." In addition to the above-mentioned consensus on wages, the conference, Mr. Splawn said, considered practically all phases of the railroad problem; but it reached no definite conclusions. Among the subjects discussed were holding companies, abandonments, new equipment loans by the government, competitive wastes, pooling of traffic, co-ordination of facilities, enlarged powers for the I. C. C. and a special court to

handle railroad reorganization cases. There was not much discussion of consolidations, but what there was included mention of compulsory consolidations. On the other hand there was a good deal of talk about temporary financial aid. No definite plan was submitted, Mr. Splawn continued, adding that a feeling pervaded the group that "whatever might be necessary would be done." Generally speaking he thinks the railroad story "tells itself." Because of the consensus against wage cuts and lay-offs, there was no discussion of financial relief through such adjustments, except that leading to a general agreement that, if lay-offs were resorted to, furloughed employees would have to be provided for.

No one attending the conference, according to Mr. Splawn, felt that he had a plan for the solution of the railroad problem. The I. C. C., he added, has no such proposal, nor does it intend to frame one. If any plan is worked out Mr. Splawn predicted that it would be the product of the group—not of any individual. Chairman Harrison of the Railway Labor Executives' Association is reported to have expanded his views in opposition to wage cuts to suggest that before such a course was taken the government should bring about railroad reorganizations and then rent the properties and take over the management. Mr. Harrison's idea is said to have contemplated that under such a set-up the railroad plant and equipment would be modernized through government expenditures; and wage cuts and lay-offs avoided.

President Roosevelt's Comment

At his regular Tuesday afternoon press conference, held a couple of hours after the railway conference adjourned, President Roosevelt reported that the latter was half way down the track and that he thought the Thursday meeting would complete the trip. He went on to say that the conferees had touched upon two or three phases of the situation where quick action could be got. Also, there was a feeling that holding companies in the railroad field are not in the public interest; and that in addition to the broad transportation there is the railroads' financial problem. The President regards the labor aspects as a lesser problem, since the conference was of the opinion that the government should take care of employees thrown out of work as a result of consolidations which it forced or encouraged. Mr. Roosevelt said he had no idea of sending a transportation message to Congress at this time; that subject, he added, wasn't even mentioned at the Tuesday meeting of the conference.

The President appeared to be impressed with data presented to him before the conference by Mr. Splawn. These data showed that on the basis of operating expenses, depreciation and taxes, the railroads account for only 20 per cent of the nation's expenditures on transportation; highway transportation, including the private automobile, accounts for 75.5 per cent; the air lines one-

fifth of one per cent; and pipe lines six-tenths of one per cent.

In addition to Messrs. Splawn and Harrison, the White House conferees were: I. C. Commissioners Eastman and Mahaffie; Senators Wheeler and Truman; Chairman Lea of the House committee on interstate and foreign commerce; Carl R. Gray, vice-chairman of the Union Pacific board; Henry Bruere, president of the Bowery Savings Bank, New York; Assistant Secretary of Commerce Draper; Chairman Jones of the Reconstruction Finance Corporation; Chairman Douglas of the Securities and Exchange Commission; W. W. Alexander of the Farm Security Administration; and Secretary of the Treasury Morgenthau. Mr. Morgenthau was a last-minute addition, his name not having been on previous lists.

Pelley Calls Rate Decision "Depressing"

The decision of the A. A. R. directors to bring the wage-reduction question before Chicago's March 18 meeting of the member roads was announced by A. A. R. President Pelley after the board's March 11 meeting in Washington. The directors, Mr. Pelley said, "are convinced that the increase in freight rates allowed, which approximates 5 per cent, is entirely inadequate to meet the critical situation which faces the railroads. He went on to characterize the decision as "depressing not only to the railroads but to industry as a whole and to general employment."

The carriers, Mr. Pelley's statement continued, "asked for an increase of 15 per cent to meet the increases in wages, taxes and prices of materials and supplies. The railroads' application to the commission was prepared by the most capable people in the industry and was endorsed by many shippers as necessary to improve the general industrial situation, as well as that of the railroads. The decision makes it impossible for railroads to make desirable expenditures in the interest of improved service to the public at reduced operating costs, or to increase railroad purchases and employment, as was anticipated. It is necessary for the railroads further to reduce operating expenses. A meeting of the member lines of the Association will be held in Chicago on Friday, March 18, to consider decreases in wage rates and such other action as may be required."

The railroads' immediate plan will evidently be to move forward on the wage cut proposition while consideration is given to a long-range program for the solution of the industry's problems. Procedures in the latter connection, it is felt, would be too long delayed to be of any help in the present crisis. Among the items of increased costs upon which the carriers based their petition for a 15 per cent freight-rate boost was the \$130,000,000 involved in the wage advances granted last August and October. The commission's report in Ex Parte 123 at one point referred to the futility of predicting the financial results of the decision because of a number of factors, among them wages, "all of which are subject to change."

Gormley Calls for Transport Policy

The law committee of the A. A. R. is understood to have been at work for some time on general problems of the railroad industry. While he did not relate his remarks to any such study, M. J. Gormley, A. A. R. executive assistant, this week told the Canadian Railroad Club that "What the railroads require is the establishment of a transportation policy that will put the regula-

tion of all transportation under the Interstate Commerce Commission, and definite direction by Congress to the Interstate Commerce Commission which will require the establishment of rates that will insure ton-mile revenue and passenger-mile revenue, which is necessary to maintain credit and permit the continual spending of large sums of money for the modernization of plant in the interest of a reduction in operating costs. This, together with a liberalization in the consolidation law to permit voluntary consolidations in line with the practice formerly existing and stopped by the Sherman Anti-Trust Law, such consolidations to require approval of the Interstate Commerce Commission."

Tariff work in connection with the Ex Parte 123 increases has proceeded apace since the decision was handed down on March 8. As stated above the railroad tariff experts worked out the details of short-cut procedures permitted by the decision to make most of the rates effective on March 28. Some few adjustments may be delayed a short while beyond that date. The general method was to eliminate the Ex Parte 115 increases and apply 10 and 5 per cent increases to the old rates. This produced rates in line with the Ex Parte 123 decision which authorized only such additional increases as would bring the Ex Parte 115 adjustments up to 10 per cent on some commodities and 5 per cent on others.

Master Tariff Filed March 16

Tariff publishing agents obtained the necessary fourth and sixth section authorizations from the I.C.C. last week, and the master tariff was filed on March 16. The master tariff, which is to be used by many of the water lines as well as the railroads, carries 5 and 10 per cent conversion tables and connecting-link supplements to present tariffs. Through similar procedures American Trucking Association, Inc., has set up a plan whereby it anticipates that the common carrier trucking industry will raise its rates in proportion to the increases granted the railroads.

Commenting on Ex Parte 123 in the March 14 issue of its Washington Review, the Chamber of Commerce of the United States says that the rate decision, "granting the carriers less than half the increase asked for, leaves early improvement in the railroad situation largely dependent upon increase in traffic volume through recovery of general business."

"The much-talked of possibilities of economies through consolidations, reorganizations and related measures," the item continues, "are uncertain in amount and will necessarily be slow of realization. The fact that the railroads were compelled by circumstances to ask the commission to grant rate increases at a time when the country is suffering from a new depression, again emphasizes the need for a long-range policy, as advocated by the Chamber, to give the railroads reasonable average return that will permit in time of general business activity reasonable reduction of indebtedness and accumulation of adequate reserves."

Labor Executives Hit Wage Cut

An attack on the wage-cut proposal, more detailed than the above-mentioned one by Mr. Harrison, was released by the Railway Labor Executives' Association for the March 17 morning newspapers. It called the major railroad problem a financial one and contended that without reorganizations "neither wage reductions, rate increases, improved traffic nor any other reasonable remedy will save the railroads; with financial reorganization, neither wage reductions nor rate increases will be

necessary." The wage-cut approach is called "as ineffective as trimming a corn to cure a toothache—the remedy must be applied where the ailment exists if relief is to be obtained."

The statement opens with the assertion that any wage reduction would be "totally unwarranted" and "will not be accepted." A demand for a downward adjustment "before the ink is hardly dry" on last year's increase agreement, it is said, would set "a destructive precedent for industry as a whole." Next the carriers are accused of having neutralized last year's boost "by laying off huge numbers of men, with the result that employment at this time in the railroad industry is below the previous low levels of 1933 and the total wage bill is now under what it was prior to the time that the wage increases were granted." Thus the Ex Parte 123 rate increases, which "will provide an estimated additional income of some \$275,000,000 per year (the A. A. R. estimate was \$175,000,000) will be 'velvet' to the railroads since they have overcome the cost of the wage increase by slashing employment."

But despite this, labor finds the railways "on the corner again with their tin cup demanding still further donations from their employees, many of whom are already living on Chinese Coolie standards of living as a result of low basic wages and part-time employment." There follows a reference to "the generosity showered upon the railways during depression years by the government and by railway employees," which, it is said, "cannot be permitted to encourage the railways to adopt a permanent policy of panhandling."

An account of the 10 per cent wage deduction agreement in effect between February, 1932, and April, 1935, is followed by an assertion that during some of those years the railways "hit a new high peak in their payments to coupon clippers." The productivity of the railway wage dollar is said to have increased by 1937 to the point where the carriers were receiving \$2.10 in operating revenues for each wage dollar, as compared with \$1.68 in 1920. On the other hand, "for each dollar of accrued interest in 1920, the railways had \$12.98 in operating revenues, which declined to \$8.81 in 1937." These figures, it is contended, "clearly demonstrate that the profits derived from greater employee efficiency have been used in greater proportion to meet accrued interest."

The labor leaders do concede that the railroads, "along with industry generally, have felt the adverse effects of the business decline in recent months"; but they see in recent carloading figures "definite signs of an upward swing in business." The railroad demand is the surest way they know of "to halt this recovery." The state-

ment closes with a listing of the following causes of railway difficulties: Their top-heavy debt burden; the inescapable necessity for financial reorganization; bus, truck, and other forms of competitive transportation; insufficient traffic; and failure to apply the rate increases previously authorized by the Interstate Commerce Commission. And "reducing wages will not correct these evils."

Photographing Waybills

(Continued from page 491)

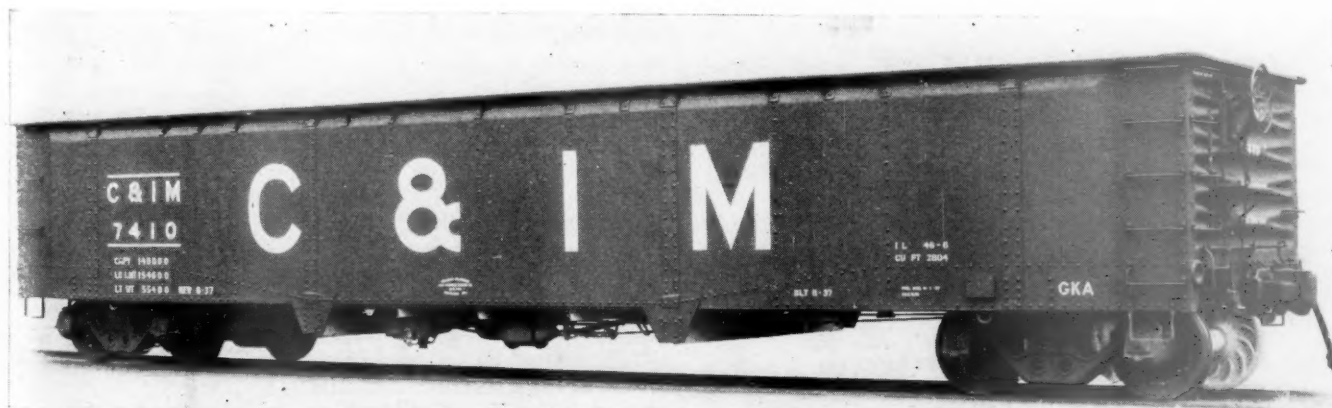
vania on the north and the Chesapeake & Ohio, the Southern and the Richmond, Fredericksburg & Potomac on the south, including all freight from the Atlantic Coast Line and the Seaboard Air Line, which moved over the R. F. & P. between Richmond, Va., and Potomac yard. It is necessary as a part of the regular operation to copy information from waybills for passing reports and other reasons for account of the different railroads interested, and, in addition, to provide a permanent and accurate record for ready reference.

The Recordak installation at Potomac Yards consists of one double-camera machine and two projectors. These are rented, and the total cost, including the films and their developing and printing, approximate \$55 per month. The bills are fed into the hopper of the camera machine which has a capacity of 90 photographs a minute. This operation is extremely simple and foolproof, as alarm bells ring if the bills are improperly fed, or if there is no film in the camera. The film is $\frac{5}{8}$ in. wide and is wound on spools, each holding 200 ft. This amount of film will take photos of 3,500 waybills. From 800 to 900 waybill photographs are made at Potomac Yards daily. The exposed film is sent to Washington each night and returned, printed and developed, to the yard office by 8 o'clock the following morning.

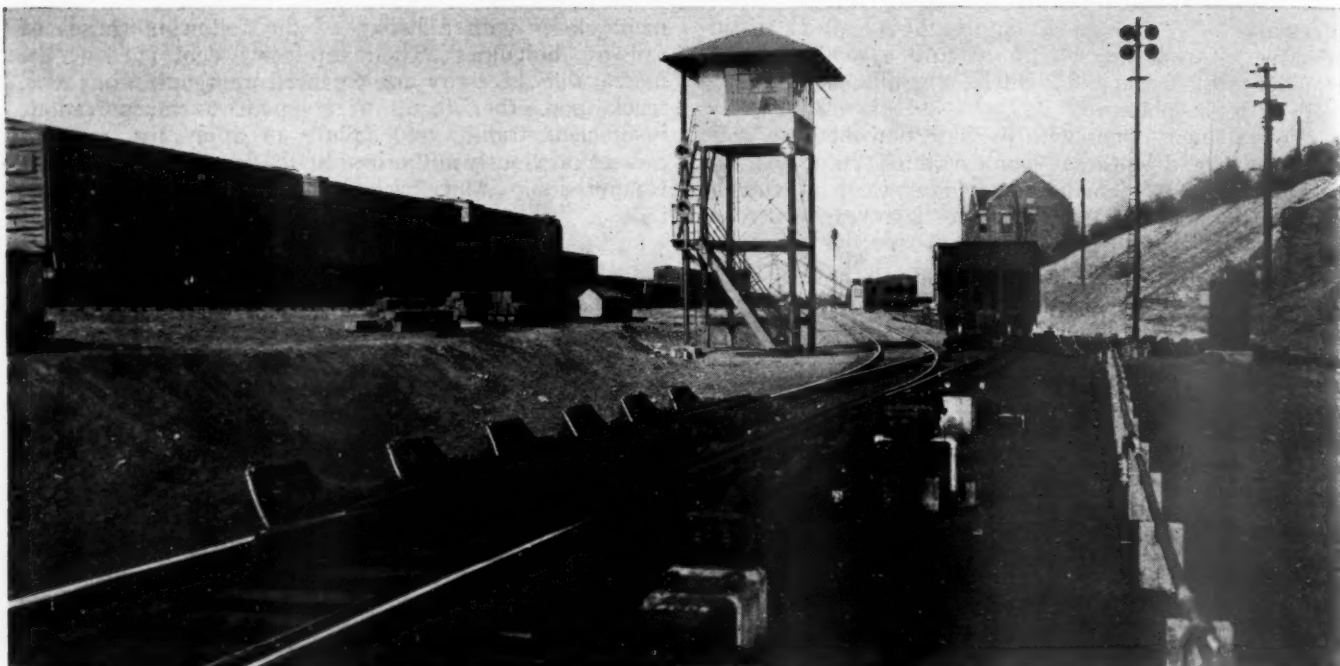
In using the film, the projectors are placed beside typewriters and the waybill photo is flashed on an illuminated glass plate which shows an impression $1\frac{1}{2}$ times the size of the original waybill. The movement of the images on this projector is controlled by a small lever.

The system is adapted particularly for the keeping of waybill records in compact form. Two sets of duplicate photos may be made at the same time, or the film company can make duplicate negatives. The film records of 1,900 waybills fit into a box 4 in. square and $\frac{3}{4}$ in. thick. Such records may be stored in a small space and provide authentic data on questions regarding diversions or changes in the waybill.

* * * *



Chicago & Illinois Midland Gondola of 70-Tons Capacity Built by the Pullman-Standard Car Manufacturing Company



View Looking From the Yard Up Toward the Hump. Tower A Shown

Lackawanna Improves Yard Operation

Installation of retarders at Scranton, Pa., and reorganization of classification have expedited traffic and reduced operating expenses

THE Delaware, Lackawanna & Western has made extensive improvements in its yard operations which affect freight car movement on the entire railroad, an important feature of which is the installation of power switches and car retarders in its Hampton classification yard at Scranton, Pa.

In general, the Lackawanna handles two distinctly different types of freight traffic, manifest and coal. The manifest freight moving eastbound from Buffalo, N. Y., and various connections to New York far exceeds the movement of manifest freight westbound. Therefore, the westward movement of empty box and refrigerator cars, and other special equipment presents a serious operating problem.

The original purpose in constructing the Lackawanna was to provide an outlet for anthracite coal from Scranton, Pa., eastward to New York harbor and westward to various points. Coal has continued to comprise the major traffic of this road. From 75 to 85 per cent of the coal moving over the Lackawanna is now mined in the vicinity of Kingston, Pa., 17.5 miles southwest of Scranton on a branch line that extends 46 miles beyond Kingston to Northumberland, Pa.

Yard Facilities Were Inadequate

Years ago it became evident that yard facilities at Scranton were not adequate, but owing to the fact that

this is rough, mountainous territory, it was not practicable to expand the existing yards. Therefore, in 1910 a new classification yard, complete with engine-house facilities, was constructed in a valley about three miles west of the main line and station at Scranton. This layout, with a hump and 33 classification tracks, known as Hampton yard, has been used until recently, almost exclusively for the classification of loaded coal cars. During each afternoon and night, loaded cars were hauled from the mines to the receiving tracks of this yard, where they were classified during the first trick. With about 20 car riders and 5 switch tenders, an average of 448 loaded cars of coal were humped daily, in addition to about 144 cars that were flat switched, giving a total of 592 loaded coal cars classified daily. In addition to the locomotive used for humping, two additional locomotives were used during the first trick to switch cars on the receiving tracks, and a total of four engine tricks were employed in yard service during the remainder of the 24-hr. period.

Traffic was not available to justify operation of the yard for two tricks, but in order to confine the classification to one trick it was necessary to place certain limitations on the operation of this yard, to handle empty cars in other yards, and to do extra switching of road trains at other points. In certain respects the extra yard engine hours mentioned above were utilized to enable more classification work to be done in the one trick.

Furthermore, in order to reduce the classification work at Hampton, some of the eastbound coal for Port Morris, N. J., and points east was forwarded directly from a coal yard at Hanover, Pa., in the mining district, rather than moving it to Hampton for classification. Also, in order to expedite operations at Hampton yard, the number of classifications was limited to 30, and the fact that more classifications could not be made caused extra switching of road trains at other division points and junctions. For example, westbound cars for Buffalo were more or less grouped together and reclassified at Buffalo for deliveries to each of several connections. In many instances trains had to be broken up at other points to get out cars for delivery to connections or points on the division. Likewise, eastbound cars were so grouped that trains had to be broken up at other yards.

Westbound Empties Another Problem

Another phase of the operating problem involved the delays to westbound empty cars. All of the westbound empties out of New York, Hoboken, Secaucus and other points were collected for movement westward to Scranton where they were set out in Taylor yard, about 3.6 miles west and a little south of Scranton station on the line to Kingston. Taylor yard is in effect a large flat storage yard, and about all that could be done by flat switching was to separate the empty coal cars from foreign line equipment, such as box, automobile and refrigerator cars, about 240 of these foreign cars being received at this yard daily. The switching was so complicated that the foreign cars were delayed, incurring excessive per diem charges. In view of the fact that these cars were moved westward out of Scranton without being classified, it was necessary to break up the trains at intermediate yards, and there arrange the cars in the trains so that cuts could be set off at the various connections. This method resulted in serious delays. In recent years the use of large locomotives has made it practicable to add empty cars to westward manifest freight trains, in order to fill out to the tonnage rating. The classification of westbound empties in Hampton yard at Scranton was, therefore, highly desirable from several standpoints.

A study was made of yard operations, switching movements, and delays to road trains for two test periods of one week each. Recommendations were then made as to



Map of Lackawanna Showing Location of Various Yards and Connections with Other Roads

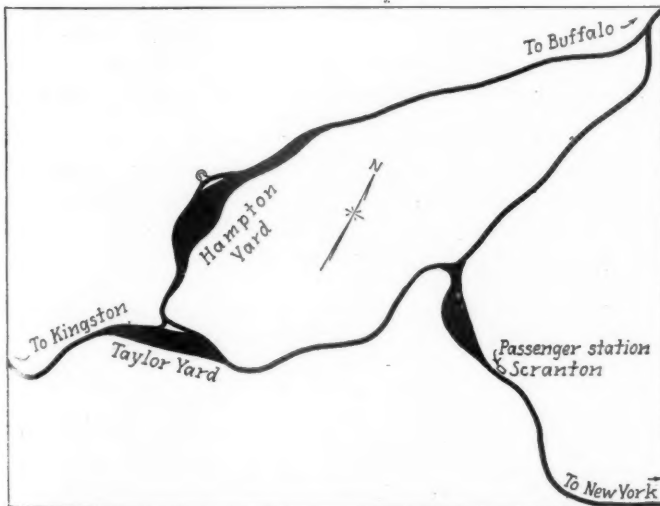
means of reducing yard delays for cars, as well as reducing delays to trains at intermediate junction points. The keynote of the situation was to increase the operating capacity of the Hampton classification yard at Scranton, so that this yard could handle not only all of the loaded coal cars originating in the vicinity of Scranton, but also westbound empties, and, furthermore, make more complete classification so as to reduce switching at other places. It was decided that this increased capacity could be secured by the installation of power switches and car retarders, thus providing facilities for the classification of more cars per hour. It was also decided that it would be practicable, from the standpoint of operating expense, to operate the yard for two tricks or more, if necessary. These facilities were installed, therefore, as will be explained in detail later.

Results Effected by New Facilities

The number of loaded cars of coal now classified at Hampton averages about 600 daily, when the mines are in full operation, and these cars are separated into 40 classifications, as compared with 25 to 30 previously. In addition, about 250 westbound empty cars, which formerly went through Taylor yard, are taken to Hampton yard daily, and separated into about 25 classifications. Some of the 65 classifications are not in operation constantly, of course, but are set up as required.

With the previous method of operation, cuts of cars were sent over the hump until all the riders were gone, and then operations ceased until enough riders had returned to permit humping to start again. With the new system, humping can be carried on continuously, so long as cars are available in the receiving yard and the yard tracks are cleared for classifications. Thus, the capacity is available to handle a large number of cars promptly on arrival. When classifying cars, the average speed past the hump is 2 m. p. h. In one instance, 74 cars of coal were classified in 28 min. of continuous hump operation. The expenses for yard operation have been so reduced that it is now economically practicable to operate the yard two or three tricks when needed. At present, the entire yard is operated two tricks, and the westbound side, on which coal cars as well as westbound empty cars are handled, is operated the third trick, the periods of operation being increased or decreased from day to day, depending on traffic.

Because of the increased number of classifications at



Map of Immediate Vicinity of Scranton Showing Relative Location of Hampton Yard, Taylor Yard and Scranton Station

Hampton it has been possible to reduce the switching of westbound trains at other yards and institute changes in operations at these points which have further expedited traffic and reduced operating expenses. With the classifications of westbound cars that are now made at Hampton, only cars moving to and from Binghamton are handled there, and as these cars can be concentrated in certain trains, many other trains can be run through intermediate yards between Binghamton and Buffalo without any switching. Eastbound cars picked up at junction points between Buffalo and Binghamton are now classified at Binghamton. To facilitate this service, 10 tracks were added to the yard at East Binghamton. These new facilities have, in turn, eliminated extended delays at other yards and intermediate points.

The Picture as a Whole

An important result of this program has been the faster movement of cars over the railroad as a whole, with the result that deliveries are being made several hours earlier. Earlier deliveries are important, not only for manifest freight in competitive service, but also for coal, as well as to get foreign empty cars off the line. As an example of the benefits of the various improvements in classification, a westbound train arriving at the yard at East Buffalo does not have to be classified, because it is made up of long cuts of cars, ready for delivery to connections.

Reconstruction of Hampton Yard

As Hampton yard was originally constructed, the grade descended from the base of the hump throughout the classification tracks to the departure end at an average rate of about 0.68 per cent. To adapt the yard for retarder operation, the grades of the yard tracks beyond the retarders were revised to 0.29 to 0.32 per cent, depending on curvature. The old ladder arrangement down the hump was rebuilt to divide the tracks

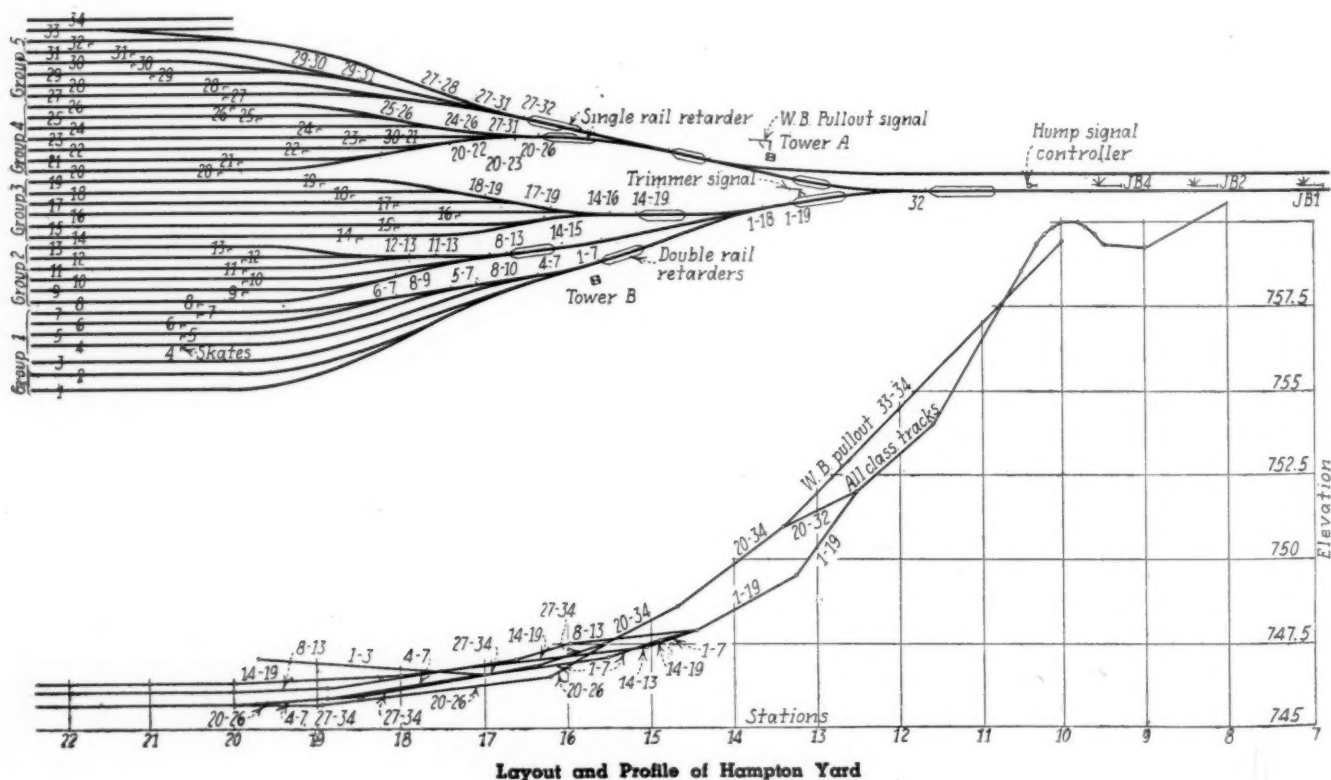
into groups, thereby reducing the number of retarders required, as well as expediting the classification operations.

The crest of the hump was lowered about 3.5 ft., and the grades revised to give a 4 per cent descending grade for 150 ft., a 1.84 per cent grade for 300 ft., and then an average of about 1.08 per cent grade to the end of the retarders. The grades on the various groups of track are shown in detail on the plan. The track that was formerly used by a motor car in returning the riders from the yard to the hump, was converted to a yard track, thus increasing the number of such tracks from 33 to 34. Tracks No. 1, 2 and 3 are set aside for the repair and storage of special equipment. Tracks No. 4 to 19 are for eastbound classifications, and Tracks 20 to 34, inclusive, for westbound classifications. The classification tracks each have capacities of 30 to 58 cars. Departing trains are made up on the classification tracks. Eastbound trains pull out through the lower end of the yard, while westbound trains pull through the retarders over the pull-out track north of Tower A.

Operative Equipment Controlled from Towers

The grade of the receiving tracks is heavier than 1 per cent descending toward the hump, so that it is not necessary to push cars to the hump. In order to bunch sufficient slack to permit cars to be uncoupled as they go over the crest of the hump, 200 ft. of 0.65 per cent ascending grade was inserted in the lead.

As shown in the diagram, the tracks are arranged in five groups, with six tracks in each of three groups, seven tracks in one group, and four tracks in the remaining group. The layout includes 30 power switches, 16 retarders, and 29 skate-placing machines. The operative equipment is controlled from two towers, Tower A controlling 8 retarders, 14 switches, and 13 skates, while Tower B controls 8 retarders, 16 switches, and 16 skates.



The machine in Tower A controls the main hump retarders, as well as the switches and retarders for the 13 tracks used for westbound cars. This permits Tower B to be shut down during periods of the day when there is no coal to be classified, while Tower A can be retained in operation to classify westbound empty cars as they arrive. A telephone system, with loud-speakers, connects the yardmaster's office, the office at the hump, and the two towers. Floodlighting is provided for operation of the yard at night.

Power Switches and Signals

The power switch machines, car retarders, and control equipment are of the electro-pneumatic type, and were installed complete by the Union Switch and Signal Company. The switch machines are the direct-acting type for yard installations, and are not equipped with lock rods. A single-rail detector track circuit extends through each switch and for 25 ft. in approach to the facing points, to prevent the throwing of a switch under a car.

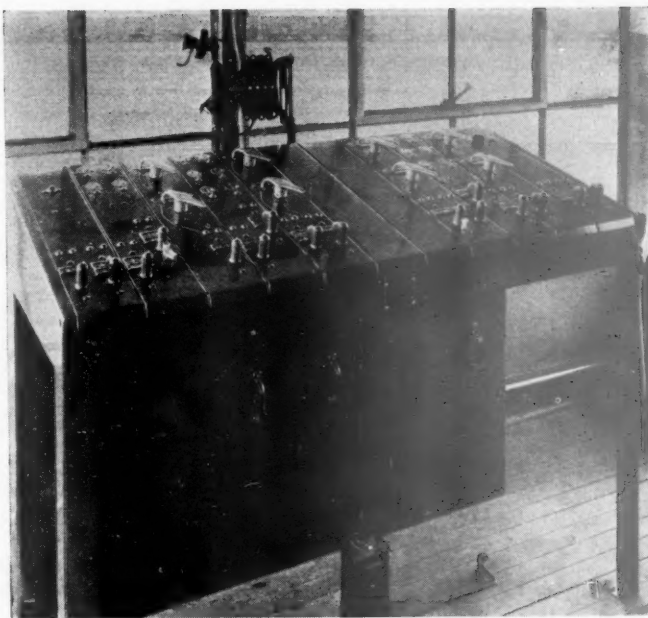
A two-indication, color-light, electric switch lamp is mounted alongside the track opposite each switch to indicate the position of switches to enginemen when trimming in the yard. Each set of switch lamps is controlled directly from the switch circuit controller. As long as the switch is in the normal position, a green light is displayed in each direction along the track. When the switch is reversed, a yellow light is displayed; all switches are normally set so that the route is lined to the left. The target lamps are also of some benefit to the tower men, although the same information is shown by machine indication lights above each switch lever.

Car Retarders

The car retarders are of the latest electro-pneumatic type, known as the Model 31. This type of retarder has a minimum number of wearing parts which are equipped for forced feed lubrication. The rail through the retarder is laid on special chairs bolted to the ties, which provide clearance and make for ease of tie tamping, inspection and maintenance. Each retarder is composed of a series of self-contained interchangeable cylinder units, spaced every third tie, or 6 ft. 3 in. apart, to which the brake beams and their associated brake shoes are attached. The air to each cylinder unit is supplied through pipes and hose connections from an electro-pneumatic control valve, arranged to furnish four different pressures, 25 lb., 50 lb., 75 lb., and full pressure of 100 lb., providing the usual four degrees of retardation. The retarder is moved to its open position by a combination of gravity and spring pressure.

The skates and skate-placing machines are similar to those furnished in other retarder-equipped yards, and each machine will, if desired, remove the skate from the rail as well as place the skate on the rail. Thus, if an operator decides that a car is going too fast and sets a skate on the track, but later finds that the car's speed is reduced in a retarder, he can reverse the skate machine in order to remove the skate before the arrival of the car.

Air pressure for the operation of the retarders, switches and skate machines is distributed over the plant in main lines of 2-in. copper-bearing steel piping, with cross lines and valves so arranged that any one pipe can be isolated and pressure still be maintained on all the major operating units. Air pressure is maintained by a set of three Ingersoll-Rand electric-motor-driven



Machine in Tower B for Controlling Power Switches, Retarders and Skate-Placing Machines

compressors, each rated at 194 cu. ft. per min. One unit is held in reserve, and the other two are electrically-controlled to maintain the pressure between 95 lb. and 105 lb.

Hump and Trimmer Signals

The engineman of the hump engine is governed by the hump signal located 175 ft. in the approach to the hump. A hump-repeater signal is located 1,450 ft. in approach to the main hump signal and a second repeater signal 1,800 ft. beyond the first. These signals are controlled by the yard foreman at the crest of the hump and provide A. A. R. recommended aspects and indications. A green light indicates "proceed at normal hump speed," a yellow light indicates "Proceed at slow hump speed," a red light "Stop," and a flashing red, "Back up."

The signals for the direction of enginemen when trimming in the yard are also of the color-light type, two units providing sufficient spread to permit at least one signal to be seen from any part of the yard. The aspects of these signals are yellow for "trim" and red for "stop," with the understanding that the engine will get out of the way so that humping can be started. These signals also are controlled by the foreman of the hump. The westbound departure train movements are controlled by a color-light departure signal located near Tower A, and controlled by the operator on duty in that tower.

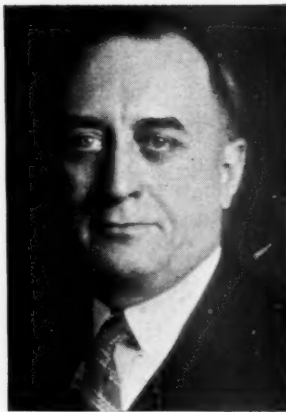
Control Machines

The control machines in the two towers are of the desk panel type, with handles for controlling the retarders, thumb-type levers for controlling the switches, and toggle levers for controlling the skates. Indication lamps repeat the positions of the switches.

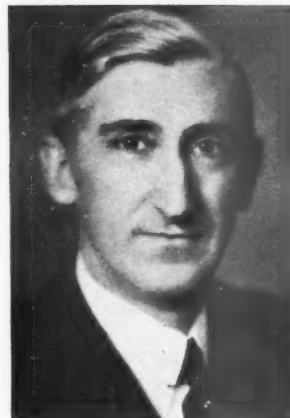
The reconstruction of the Hampton yard and the installation of the retarder system were handled under the direction of G. A. Phillips, chief engineer of the Delaware, Lackawanna & Western, and J. E. Saunders, signal engineer, had direct charge of the installation of the retarder system.



J. C. Irwin
President



F. E. Morrow
President-Elect



E. M. Hastings
First Vice-President

Engineering and Maintenance Officers Meet at Chicago

A. R. E. A. holds 39th annual convention, with intensive three-day program in the interest of greater efficiency and economy

CLIMAXING another year of intensive activity, the thirty-ninth annual convention of the American Railway Engineering Association was held at the Palmer House, Chicago, on March 15, 16 and 17. Undaunted by the unfavorable conditions which now face the railways, railway engineering and maintenance officers from all sections of the United States and Canada carried through one of the most constructive programs in the history of the association. Two general sessions each were held on Tuesday, Wednesday and Thursday, with an association luncheon on Wednesday and a joint dinner-meeting with the Western Railway Club on Wednesday night.

Coupled with these activities of the association was the equipment and materials exhibit of the National Railway Appliances Association held this year, for the first time, in the new International Amphitheatre, the largest exhibition hall in Chicago. Details of this exhibit are reported elsewhere in this issue.

While there was evidence throughout the convention of an undercurrent of disappointment with the continued small earnings of the railways, and particularly with the inadequate freight rate increase granted by the Interstate Commerce Commission, nowhere was there other than an attitude of determination to meet the situation as it exists and to bend all of the activities of the association toward meeting the problems present through measures which will bring greater efficiency and economy in the field of rail transportation.

At the six general sessions of the convention, 27 standing and special committees of the association presented reports, which evidenced a widening scope of activity to meet the demands of modern rail transportation, and a still further increased interest in research and in field and laboratory testing as a means of solving many of the problems which confront engineering and

maintenance officers. All of the sessions of the convention were presided over by President J. C. Irwin or Vice-President F. E. Morrow.

A special feature of the opening session of the convention was the conferring of honorary membership on four past-presidents of the association; W. B. Storey, retired president of the Atchison, Topeka & Santa Fe; C. A. Morse, retired chief engineer of the Chicago, Rock Island & Pacific; J. G. Sullivan, retired chief engineer of the Canadian Pacific, Western Lines; and J. L. Campbell, retired chief engineer of the Northwestern Pacific. In the absence of Mr. Sullivan, the award on his behalf was received by Past-President J. E. Armstrong, assistant chief engineer, Canadian Pacific.

The report of Frank McNellis, assistant secretary, which, in the absence of Mr. McNellis, was read by W. S. Lacher, the newly-appointed secretary, showed that receipts during the last year exceeded disbursements by \$6,169.48, and that the membership on March 1, 1938, totaled 1,938. The registration at the convention was 687 members and 400 guests, a total of 1,087, as compared with a registration of 706 members and 278 guests, a total of 984, last year.

Election of Officers

At the final session on Thursday afternoon, the following officers were declared elected and were installed in office: President, F. E. Morrow, chief engineer, Chicago & Western Indiana, Chicago; second vice-president, George F. Fanning, chief engineer, Erie, Cleveland, Ohio; treasurer, A. F. Blaess, chief engineer, Illinois Central, Chicago (re-elected). At this time E. M. Hastings, chief engineer, Richmond, Fredericksburg & Potomac, was advanced automatically from second vice-president to first vice-president. The new directors

elected were: C. J. Geyer, engineer maintenance of way, Chesapeake & Ohio, Richmond, Va.; F. R. Layng, chief engineer, Bessemer & Lake Erie, Greenville, Pa.; and J. G. Brennan, engineer of grade crossings, Association of American Railroads, Washington, D. C.

President's Address

Immediately after calling the convention to order, President Irwin presented a very complete and informative review of the many activities of the association during the year. In this review he referred at length to the retirement of E. H. Fritch after 38 years' service as secretary and to the negotiations that led to the selection of Walter S. Lacher, engineering editor of the *Railway Age*, to succeed him.

Mr. Irwin then referred to the study that had been made of the committee organization during the last year, which has resulted in the elimination of the Committee on Shops and Locomotive Terminals and the distribution of its work between the committees on Buildings and on Yards and Terminals, to the consolidation of the Committee on Ballast with that on Roadway and to the consolidation of the Committee on Economics of Railway Location with the Committee on Railway Operation. Mr. Irwin also outlined the care with which the Board of Direction arranges for the co-ordination of the work of other committees.

Since the A. R. E. A. devotes a large part of its attention to the development of its Manual on Recommended Practice, Mr. Irwin referred at some length to the use of these standards. "Some of our recommended practices," he said, "can well be used by any railroad with such modifications as it sees fit to make without having any effect on the practice of other railroads. There are other types of our recommended practices which are of concern to more than one railroad on account of the relations between them and other railroads. Furthermore, there are some practices which should be carried to the status of American standards on account of their mutual interest to other industries as well as other railroads."

Mr. Irwin also referred at length to the research work that is now being directed by committees of the association, including the studies of the Special Committee on Stresses in Railroad Track under the supervision of Dr. Talbot, the investigation of transverse fissures, the special rail investigation, the tests of various types of joint bars, and the investigation of the continuous welding of rails, that are being directed by the Rail committee and the boiler feed water investigation directed by the Water Service committee. Mr. Irwin also referred to the appointment during the year of G. M. Magee as research engineer of the Engineering division. He also stated that the investigation of the relation between track and rolling stock has been re-initiated through a joint committee of the Engineering division (A. R. E. A.) and the Mechanical division of the Association of American Railroads. He stated also that these two divisions have undertaken a joint study of the prevention of damage due to brine drippings.

Mr. Irwin stated that the association has voted to reduce the number of bulletins from 10 to 7 per year. In connection with the publication of the association, he directed attention to the need for a comprehensive index. In conclusion, Mr. Irwin contrasted the public benefit resulting from much of the Public Works expenditures these days with that derived from the federal grade separation program, and commended the work that is being done in the latter direction under the direction of Thomas

H. MacDonald, chief of the United States Bureau of Public Roads.

J. M. Symes Addresses Convention

In an address at the opening session, J. M. Symes, vice president, Association of American Railroads, spoke on the railway situation of today in part as follows:

I desire to touch upon the railroad problem. Some say that government ownership is the answer. We had a taste of that during and following the World War. It requires no further comment.

Others say that the elimination of wasteful competitive practices within the industry by co-ordination of facilities will produce sufficient economies to save the industry. Many people believe that co-ordination is a new subject. Yet it has been common practice in the railroad industry for years, as is evidenced by the fact that approximately 24,000 miles of tracks, 203 engine terminals, 1,366 freight stations, 1,902 passenger stations, and 618 yards are jointly operated, 472 large bridges are used by more than one carrier and there are 1,013 points where joint inspection of freight cars is in effect. I will not deny that additional economies cannot be secured by practical co-ordination but I am convinced that the amount of money to be saved by co-ordination is not enough to have any appreciable effect on the present situation.

Some say that wholesale consolidation is the answer. To deny that benefits would not accrue from consolidation would be to deny the wisdom of consolidations that have heretofore taken place. Most of the larger rail systems of the country today were created by the consolidation of a number of small companies. The consolidation of rail companies into a fewer number of systems under private ownership is desirable and will eventually be accomplished, but there are fundamental principles that must receive careful consideration. It is desirable to avoid costs brought about by unnecessary competition between rail carriers, but we must also guard against eliminating the principle of competition, which is the background of American industry. With an improvement in the general railroad situation, the matter of consolidation will be solved by negotiation between railroads, which is, in my opinion, the only practicable way it can be solved.

Still others say that the carriers should reduce their charges and in that way obtain a sufficient volume of traffic from our competitors to make possible profitable railroad operations, but a rate war between competitive transportation agencies will not be helpful to any of us.

What is wrong with the railroads? If the railroads are providing a satisfactory service to the public, if they are not confronted with labor difficulties, if their plant is capable of handling existing and prospective business—then what is the matter with them?

(1) They have been starving by reason of general business conditions, which is reflected by the volume of traffic they are handling; (2) they are handling this light volume of traffic at rates that are so low that it is impossible to earn a living, let alone a return on their investment; (3) they are paying the highest wages in their history and have been confronted with tremendous increases in the cost of the thousands of things they have to buy; (4) their competitors not only do not have to pay taxes to the same extent as the rail carriers, but they are, in addition, subsidized with Government moneys, a large part of which is derived from taxation on the railroads; and (5) they are continually confronted with legislation, both state and federal, that will materially increase their operating expenses without any compensating benefits to the railroads.

After careful consideration by men best qualified in the industry to consider such matters, it was decided to petition the Interstate Commerce Commission for an increase in freight charges. Instead of granting what was adequate only to cover the increased operating expenses brought about by increased taxes, increased wages and increases in the cost of materials, the Commission authorized about 40 per cent of that amount. The decision was disappointing.

Reductions in wages of rail workers are now essential to

prevent widespread unemployment. It is my belief that the rail workers of this country will view the situation in its present light and come to the support of the rail cause as they did in 1932.

Charles Donnelly Addresses Luncheon

In an address before 800 members and guests at a luncheon on Wednesday noon, Charles Donnelly, president of the Northern Pacific, described the critical situation now confronting the railways as a result of the rate decision in part as follows:

The action of the Commission on the application for a rate increase of 15 per cent is keenly disappointing to the railroads and leaves the railroad problem unsolved. It is true that the authorization of the full increase asked for or, indeed, of any increase which the carriers would have wished to make effective, would not have solved their problem without a very considerable increase in the volume of traffic moving. With increases over 1933 in operating expenses and taxes amounting to 665 millions of dollars, there must be a marked increase in traffic volume before the railroads can report operating incomes equal to those of a year ago, even with the increased rates in effect.

It is sometimes said that the railroads are now passing through an era comparable with that of the years 1893 to 1896, and that as we emerged successfully from that depression, so will we do from this. But the transportation picture today is widely different from that of the nineties. Then the railroads enjoyed what was in fact, and what was referred to frequently by the courts, as being a practical monopoly. This is no longer true. Railroads are, of course, the largest carrying agency and will doubtless continue to be so for a long time to come, but they are meeting with active and aggressive competition in every department of service rendered by them, and the inroads of their competitors are increasing from year to year.

Everyone has come to recognize that things cannot go as they are; that unless there is some improvement in the set-up under which private operations are conducted, government ownership, or operation, or control in some form, is inevitable. Indeed, it may be said that government intervention has already taken place, because the government, through its Reconstruction Finance Corporation, now has a stake of 411 million dollars in the railroads in the form of advances to them; and this amount will undoubtedly be increased in the months immediately ahead of us.

Comparatively few favor government ownership or operation of the railroads as a matter of choice. If it comes, it will come as a matter of necessity; and the question is whether there is any way of avoiding it. A restoration of the traffic volume of nine or ten years ago would probably make it unnecessary, even though our freight rates, as now increased, are far below what they were then; and even though our expenses and taxes are much heavier than they were then; but there is no prospect of such an increase in traffic in the near future.

Conditions being what they are, I see no prospect of improving them under private management, except by consolidations of the country's 240,000 miles of railroad, and a reduction in the total number of companies operating them to not more than 18 or 20. This was the course taken in England in 1921, and the job was completed in 1923. They now have four systems, where before they had 120 companies operating the 22,000 miles of British railways. This result was accomplished in England by legislation making consolidation compulsory; and we must enact similar legislation before it can be accomplished here.

Report on Standardization

E. M. Hastings, Chairman*

The committee's report covered all three of its assignments, having to do with the determination of what A. R. E. A. recommended practices should be advocated for general use on the railways; what A. R. E. A. recommended practices should be

sponsored as projects for National Standardization; and maintain contact with standardization bodies and keep the association informed on important matters developed by such contact.

A. R. E. A. Practices Recommended for General Use

Because so few changes were found necessary, the committee did not offer again this year the tabulation presented last year of those recommended practices of the association which it recommended be advocated for general use on the railways. However, it made reference to this tabulation and suggested that it be given careful consideration by members of the association. In this latter connection, it cautioned members using the tabulation to bear in mind the revisions in the Manual which affect the practices recommended.

National Standardization of A. R. E. A. Practices

The committee suggested no new A. R. E. A. recommended practices for National Standardization, but, as a matter of information, it advised that the Specifications for the Manufacture and Installation of Motor Truck, Built-In, Self-Contained and Portable Scales for Railway Service—1936, are in the process of being advanced to an American Standard, and also that the Specifications for the Manufacture and Installation of Four-Section Railway Track Scales are on their way toward approval as American Standard.

Contact With Standardization Bodies

In addition to its other reports, the committee commented in some detail upon the current activities of the American Standards Association and of the Canadian Engineering Standards Association. However, deviating from its usual practice, it did not present this year a list of the Standards approved by the A. S. A. during the last year, or a tabulation of A. S. A. technical projects on which the Association of American Railroads is now co-operating.

This report was received without discussion.

Signals and Interlocking

C. H. Tillett, Chairman*

In accordance with its usual practice, the committee presented its report under two assignment heads: Developments in Railway Signaling, and Principal Current Activities of the Signal Section, A. A. R.

Developments in Railway Signaling

The entire report under this assignment was given over to a brief description of route interlocking, as compared with conventional interlocking, in which it has been the practice to operate each switch (or crossover) separately by moving corresponding levers, and then, after the switches have been moved and indicated, to clear the signal by operating its lever.

Concerning route interlocking, the committee had the following to say:

"In the route interlocking system the operator has before him an illuminated diagram of all the tracks and signals under his control, and he can direct trains through the plant simply by pushing buttons or turning knobs on the diagram, one at the entering point and one at the leaving point. All of the switches in the selected route automatically assume the correct position for that route, and then the signal clears, provided, of course, that the route is not obstructed, and provided that no conflicting route is already established. If the track layout provides more than one route between two points, one of these is made the preferred route and it will normally be selected and set up, but, if the preferred route is not available for any reason, the secondary route will be set up automatically. The passage of a train through a route, occupying the successive track circuits, sets the signal at stop automatically and leaves the switches behind it released for further use.

"Appropriate light indicators provide the necessary information to the operator regarding the positions of switches, the clearing and automatic restoration of signals, and the occupancy of track circuits by trains. Separate switch controls, not nor-

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* Signal Engineer, Canadian National.

mally used, are provided for testing and for adjustment when necessary in co-operation with the signal maintainer.

"All of the safety features of conventional power interlocking are provided, such as approach, route and section locking, semi-automatic control of signals, and protection against the setting up of conflicting routes."

The committee advised that four installations of route interlocking are now being made.

Current Activities of the Signal Section, A. A. R.

As this part of its report, the committee presented a list of the principal subjects to which the Signal section had given attention during the fiscal year 1936, and upon which it reported at its annual meeting in March, 1937. This list includes 32 subjects, and makes reference to the publication and sale of Chapter XXII-Manual and Controlled Manual Block Systems and Fundamental Theory of Direct Current, American Railway Signaling Principles and Practices, which is the twenty-first of a series of twenty-four pamphlets being prepared by the section for the education of signal men and others interested in this subject.

In addition, the committee listed the specifications, drawing, requisites and miscellaneous matter revised by the Signal section; the new specifications, drawing, instructions and forms prepared or handled; and the specifications and drawings which the section recommended be removed from the Manual.

The report was received without discussion.

Report on Buildings

O. G. Wilbur, Chairman*

Of the 11 assignments to the committee, it presented reports on 5, offering Manual material with regard to improved wearing surfaces for platforms; the destructible value of structures which can be collected in case of fire; and paints.

Improved Wearing Surfaces for Platforms

Under this assignment, the committee, after presenting a classification of the uses and types of surfaces for platforms in railway service, gave consideration to platforms of wood, brick, concrete, bituminous materials, wood blocks, and steel and iron plates. In each case it discussed the adaptability of the material for various types of platforms under different conditions; the extent of its use; the essential features involved in its application; and its special advantages.

A recommendation that the report be accepted for inclusion in the Manual, was adopted.

Collection on Fire Insurance in Case of Fire

At the 1936 convention of the association, the committee offered as information a report on the determination of the destructible value of structures which can be collected in case of fire. This material was reprinted in the committee's report for the present year, with the recommendation that it be approved for inclusion in the Manual.

The material in question points out the importance of a clear understanding of the provisions and terms of fire insurance policies, and cautions that it is the obligation of the insured to see that the stipulation in the insurance contract, or policy, cover all of the items which are legitimate claims in case of loss or damage. Then, pointing out the amount that may be collected in case of loss or damage is based upon an accurate determination of the loss or damage to the insured, taking into consideration the provisions of the contract, the report discusses the claims possible in case of total loss and partial loss, and then the correct method of arriving at reproduction costs. In this latter connection, the committee listed a large number of items of cost, often overlooked, which it stated should be included in reproduction costs in addition to the delivered and erected or installed costs. The material submitted also discussed depreciation and the manner of its determination in connection with collecting on insurance policies in case of fire losses.

Commenting on the report, W. A. Radspinner (C. & O.) said that in spite of the recommendations of the committee, the actual amount that can be recovered in case of fire is determined

* Assistant Engineer, Baltimore & Ohio.

by the Insurance Rating Bureau in that part of the country involved. Chairman Wilbur, admitting this, pointed out that the recommendations of the committee are intended as a guide for the railways in presenting their claims, with the aim of enabling them to secure the most favorable recovery value from the bureau.

The report was then approved for inclusion in the Manual.

Paints and Their Economical Selection

The committee gave further consideration to the material which it submitted last year with regard to the different types of paint and their economical selection, and, as its report this year, resubmitted this material with the recommendation that it be adopted for inclusion in the Manual. The material includes a discussion of the importance of adequate test data; definitions of color, gloss and the various types of paint failures; recommended methods of recording test data; and the factors which should be taken into consideration in making an inspection of paint surfaces for comparative purposes. Included with the material was a report form, offered as a convenient means for recording data collected in comparative exposure tests.

This report was adopted without discussion.

Design of Buildings to Withstand Earthquake Shocks

The report presented on this subject was a relatively brief treatise designed essentially to call attention to the importance of giving consideration to the possibilities of earthquake shocks when designing railway buildings, especially buildings located in areas known to be subject to seismic disturbances, and to set forth some of the major factors which should be given consideration in earthquake-resistant construction. Following a discussion of earthquakes in general and their possible effects, the report referred to the forces to be resisted as the result of earthquakes and to the several theories with regard to earthquake-resistant building construction, and then discussed separately, the more important factors which should be given consideration in the design of earthquake-resistant buildings of concrete, steel, wood and masonry-unit construction. As a supplement to its report, the committee presented a bibliography of published material relating to earthquake damage and to building construction design to withstand earthquake shocks.

Insulation of Railway Buildings

In a report on this subject, offered as complete and for information, the committee, at the outset, discussed the theory of heat transfer; the purposes of insulating buildings; qualities of the insulation to be used; the value of air space as an insulant; and the value of double glazing in reducing heat losses. It then discussed briefly the various types of insulants available, the general method of their application, and their application to railway buildings. Concerning the value of insulating buildings, the report stated that a properly insulated building reduces fuel consumption from 15 to 25 per cent, and will require from 10 to 20 per cent less heat radiation and boiler capacity, and smaller pipe sizes.

Other Subjects

Without making report, the committee stated that progress had been made in the study of its assignments covering revision of the Manual, specifications for railway buildings; the maintenance of wearing surfaces of platforms and floors in railway buildings; air conditioning of railway buildings; and types of foundations best suited for railway buildings.

Report on Electricity

H. F. Brown, Chairman*

In fulfilling its assignment to keep the association informed concerning developments in the application of electricity to railway service, and with regard to the principal current activities of the Electrical section, the committee followed its practice of past years and presented as its report a brief synopsis of the reports made by the different committees of the Electrical section at its last meeting and published in full in Bulletin 396, dated September, 1937.

* Asst. Elec. Engr., New York, New Haven & Hartford.

The subjects covered in the reports were: Power supply; electrolysis; overhead transmission line and catenary construction; standardization of apparatus and material; electric heating and welding; application of motors; clearances for third-rail and overhead working conductors; protective devices and safety rules in electrified territory; specifications for track and third-rail bonds; illumination; design of indoor and outdoor substations; high tension cables; and application of corrosion-resisting materials to railroad electrical construction.

This report was accepted without discussion.

Yards and Terminals

Hadley Baldwin, Chairman*

Four subjects were reported upon in detail by the committee, having to do with passenger station layouts, scales used in railway service, expediting freight car movements through yards, and driveway widths at freight houses and team yards. In addition, the committee presented its usual bibliography on subjects pertaining to yards and terminals and reported progress in its study of two other subjects.

Passenger Station Layouts

The committee confined its work during the year to the consideration of present trends in passenger station design, which should be considered in connection with the information collected previously. With this end in view, it directed inquiries to those in charge of the 47 passenger stations concerning which detailed information had been collected in 1922, asking what changes, if any, have been made in these stations during the last 15 years, or are now contemplated, and the reasons therefor. Special study was also given to the stations built or remodeled extensively within this period.

As the result of its inquiries, the committee pointed out that there have been seven general trends in passenger service and associated activities within recent years which have affected passenger station design. These it listed as the relative reduction in local traffic and the increase in long distance travel; the increased length of trains; the increased use of automobiles by patrons arriving at and departing from stations; the greater attention being given to the convenience and comfort of patrons; the desirability of increasing revenues from concessions; the tendency to replace trunk baggage with hand baggage; and faster train schedules.

In addition to these general trends, the committee reported briefly upon a considerable number of developments in passenger station design which have been evidenced in alterations made to old stations, and which have been dominant in the design of the more recently built stations. Included among these trends or developments are the use of the electric eye to open and close doors, and the installation of moving stairways for the handling of through passengers.

Considering as obvious the reasons for and applications of most of the trends and developments mentioned, the committee, in the balance of its report, made detailed comment concerning only the use of the electric eye to open and close doors, and the installations made of moving stairways.

Appended to its report as Exhibit A, the committee included a bibliography of articles which have appeared concerning large passenger stations built or extensively remodeled.

Expediting Freight Car Movements Through Yards

For the basis of its report on this subject, which was submitted as a final report, the committee requested of the operating officers of 50 Class I roads the benefit of their experience with facilities intended to expedite yard movements, and presented a summary of the answers received to the following questions:

- (1) What facilities designed to expedite freight car movements through yards has your road installed since the end of Federal control?
- (2) What outstanding effects have these various installations had?
- (3) Have you any suggestions as to possible improved use of such facilities?

* Retired Special Engineer, Cleveland, Cincinnati, Chicago & St. Louis.

- (4) What facilities, in addition to those listed by the committee, do you consider important?

For the benefit of those particularly interested in this subject, the committee also referred to certain reports presented before the American Association of Railroad Superintendents, and tabulated for ready reference all pertinent matter appearing in the Manual and the proceedings of the A.R.E.A. In conclusion, it reiterated its belief that the problem in question is primarily one of operation, but stated that modern facilities, where economically justified and properly designed and located, are a most important factor. It recommended including in the Manual a notation calling attention to the report on "The Expediting of Freight Car Movements Through Yards," which appears in Vol. 39 of the proceedings. This recommendation was adopted.

Scales Used in Railway Service

The report dealt largely with the revision of the material in the Manual dealing with tolerances for large-capacity automatic-indicating scales, for which completely revised material was submitted for adoption. The recommendation in this regard was brought about by complete revision in the corresponding material adopted by the National Conference on Weights and Measures, which made the present Manual material obsolete.

Concerning specifications for the manufacture and installation of two section, knife-edge railway track scales, reported upon last year with the hope that final specifications might be presented at the present convention for adoption, the committee stated that it was not prepared at this time to submit final recommendations, in view of a widespread difference of opinion concerning the specifications. The recommendations of the committee with regard to revision of material in the Manual were adopted.

Freight House and Team Yard Driveway Widths

The committee continued its work of previous years on this subject with the purpose of securing the latest information with regard to the widths of driveways now in use at freight houses and team yards, and the sizes of vehicles using them. Its report was essentially a review of its report in 1928, but with pertinent comments and observations throughout, showing the changes in conditions which have taken place since the presentation of the earlier report. In its present report, which was submitted as final, the material was presented under the following heads: Driveway traffic survey; legal restrictions of vehicle lengths; lengths of vehicles; trend of vehicle lengths; freight house driveways; and team yard driveways.

In its conclusions, the committee offered a number of substitutions for material appearing in the Manual under Article 352—Freight House and Team Yard Driveways, the more important of which are as follows:

- (1) Substitute for paragraph (b)—The width of a freight house driveway should allow trucks to be backed up to the freight house at right angles and leave additional room for two thoroughfare lanes for moving vehicles.

- (2) Substitute for paragraph (c)—Team track driveways normally should be of sufficient width to allow the longest single unit trucks using the driveways to stand at right angles to the car, with sufficient space remaining in front of the truck to allow another truck of maximum width to pass.

The most important addition to the Manual recommended was a new paragraph (d), which reads as follows:

- (d) For general use at locations where vehicles operate only within the immediate metropolitan area, the size of vehicle recommended for determining driveway widths is 8 ft. by 28 ft. At locations where over-the-road traffic is to be accommodated, or where extreme congestion may occur, the size of vehicle recommended for use in calculations is 8 ft. by 35 ft. Ten feet is the proper width for a thoroughfare lane. If the 34-ft. length is selected for design purposes and only a limited number of long trucks are anticipated, one thoroughfare lane may be provided even though traffic is not limited to one-way operation.

Supplementing the main body of its report, the committee submitted as Exhibit 1 a form for recording information collected in making driveway traffic surveys, and also a number of tabulations and charts containing the data which it collected for the basis of its report.

The recommendations of the committee with respect to revisions of the Manual were approved.

Bibliography

Continuing its practice of past years, the committee presented a bibliography of published articles, papers and books, dealing with subjects relating to its assignments, including passenger stations and terminals; freight stations, yards and terminals; and rail and water terminals.

Other Subjects

In addition to the foregoing subjects, the committee reported progress in its study of classification yards and of general revisions of the Manual, but made no report on either of these assignments.

Report on Shops and Locomotive Terminals

L. H. Laffoley, Chairman*

In a report of limited scope as regards the number of subjects handled, the committee presented, as information, a complete report with regard to the installation of welding equipment in shops and at locomotive terminals, and a brief final report with regard to power plants, with the recommendation that this latter subject be discontinued.

Welding Equipment in Shops and Terminals

The committee confined its study to oxy-acetylene and electric arc welding as used in connection with the latest practices on various railways. Recognizing the impossibility of attempting to cover the various types of specialized equipment used, in view of the constant changes and improvements being made in welding and cutting apparatus, it built its report largely around the matter of the generation of gases and of electric current, and their delivery to the point of use in the most advantageous manner. The main subject heads under which the report data were presented were as follows:

A general description of oxy-acetylene cutting and welding; calculation of the estimated annual savings to ascertain if an oxygen acetylene plant would be justified; plan of installation and operation; generator house and pipe line installations; and electric arc welding.

Under the last mentioned head the committee discussed both a.c. and d.c. welding, and presented a list showing the various types and capacities of portable welding machines obtainable from manufacturers. The report also included brief reference to stationary welding installations.

At the end of its report, the committee offered the following conclusions:

Wherever welding is used for general purposes, that is, where it is not confined to routine work on a limited number of locomotive and car details, adequate equipment should be provided for the use of both the electric arc and oxy-acetylene methods. It is impracticable to define the proper and economic field for each method, which emphasizes the necessity for competence on the part of the welder and the need for proper supervision.

Power Plants

The committee attempted a study of power plants constructed or being constructed at locomotive terminals, and to measure their functions by a yardstick, but found numerous difficulties confronting it. In the first place, it found that there are few plants under construction, and that those being constructed are being designed usually to perform only a limited number of functions.

Other Subjects

No reports were presented on the other assignments of the committee, dealing with revision of the Manual; drop pits; and the adaptation of enginehouses, shops and engine terminals for the handling of oil-electric locomotives and rail cars.

The report, which in the absence of chairman Laffoley, was presented by H. C. Lorenz (C. C. & St. L.), was received

* Assistant Engineer, Canadian Pacific.

without comment. At the conclusion of the report, President Irwin announced that this committee will be discontinued, for the reason that the work it has been doing can be better taken care of in the future by other committees.

Water Service, Fire Protection and Sanitation

R. C. Bardwell, Chairman*

The committee gave consideration to nine subjects during the year and presented reports on seven. Among these were completion reports on four of its assignments covering taste and odor control of drinking water, fire hydrants, classification and disinfection of drinking water supplies, and classification of water service material, all of which were offered as information. The committee made no recommendations for changes in the Manual.

Taste and Odor Control of Drinking Water

The report on this subject was essentially a summary of current information on this subject. In it, the committee gave detailed consideration to the problems involved and the various methods which have been used in taste and odor control, discussing these matters under the following heads: Causes of tastes and odors; prevention of tastes and odors; microscopic organisms; copper sulfate treatment; taste and odor prevention with ammonia-chlorine treatment; removal of tastes and odors; aeration; prechlorination; super-chlorination; ozone-potassium permanganate bleaching clays; activated carbon; activated carbon application to reservoirs; and granular activated carbon.

Following this part of its report, the committee discussed briefly the Standard Method of Water Analysis, which it pointed out has not been considered entirely satisfactory, and also the Threshold Method of Odor Determination, a more recent development.

Pitting and Corrosion of Boiler Tubes and Sheets

During the last three years, the committee has been assembling all available information concerning that peculiar type of cracking of boiler sheets and rivets which has been commonly called "Embrittlement" or "Caustic Embrittlement," and has co-operated in the research which has been conducted on this problem at the Bureau of Mines, College Park, Md., under the direction of Dr. W. C. Schroeder, toward which the Association of American Railroads contributed \$15,000 in 1936. In view of what is being found, the committee said that it is particularly unfortunate that the terms embrittlement and caustic embrittlement were ever used, because it pointed out that investigations now indicate that the trouble is not one of embrittlement at all, and that the same type of cracking can be developed in solutions containing no trace of caustic materials.

In the body of its report, the committee discussed the progress which is being made in the Bureau of Mines studies, and the results of tests made with a wide range of water solutions. A summary of the work thus far, it said, indicates that many inorganic chemicals, including chlorides, carbonates, phosphates and sulfites, may prevent cracking under only certain limited operating conditions. On the other hand, it pointed out that the investigation shows that certain organic materials, such as lignin compounds and certain tannin materials, exert a marked influence in preventing the type of cracking known as inter-crystalline corrosion.

Value of Water Treatment

The report on this subject stressed the large savings possible through the suitable treatment of locomotive boiler waters, and reviewed the committee's past estimates of savings per pound of scaling solids removed from such waters, and formulæ submitted for the determination of the economic principles involved in water treatment. At the same time, it pointed out the difficulties involved in setting up definite numerical values to express the economy or benefits of water treatment, and admitted that difficulty in this regard, with the lack of basic data, was retarding the making of necessary capital expenditures for improving boiler waters, and was making it difficult to substantiate the increased water costs which are essential to produce waters that will meet

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present-day locomotive boiler requirements. The committee expressed the belief that, in spite of the difficulties inherent in the problem, it should now be possible for organized research to formulate authoritative data acceptable as standard on all roads. Very few other branches of railroad engineering, it pointed out, present such attractive fields for organized research as the assignment on the value of water treatment. In substantiating this claim, it repeated the estimate contained in its report of 1937, that \$12,000,000 can be saved annually by the elimination of corrosion resulting from boiler waters, and that a much larger amount could be saved through the elimination of scaling solids in boiler waters. Fortunately, it pointed out, the elimination of scaling solids usually overcomes corrosive difficulties.

At the end of its report, the committee presented a brief summary of available data on the practices of 22 roads with regard to water treatment, indicating primarily the extent of such treatment and the various methods employed.

Design, Operation and Maintenance of Fire Hydrants

In a brief report submitted as information, the committee first discussed the various types of hydrants, pointing out that the three types used most generally are the positive type, the compression type, and the slide gate valve type. Following general comments with regard to these three types and their special features, the report dealt with the importance of the proper maintenance of hydrants, and also with the importance of having fire hydrants conform with those of municipalities in the same area in order that they may be used interchangeably by both the railway's fire-fighting equipment and that of local fire departments. The report then discussed the classification of hydrants, and a color scheme for painting hydrants according to their capacity so that at a glance, a fire department may know the relative fire flow which may be expected from any hydrant.

Toward the conclusion of its report, the committee recommended that the fire prevention and water service departments of individual roads should keep on file, preferably in chart form, a statement of the types of hydrants used by communities along its lines, as well as the type in company installations at various points. As an example in this regard, it submitted as Table A a section of the fire hydrant, hose and coupling chart maintained on the Chesapeake & Ohio.

Regulations Pertaining to Railway Sanitation

The main part of the committee's report, which was submitted as information, embodies the principal features of a circular sent to the railways on October 25, 1937. This material was presented under the two heads "Sanitary Handling of Water and Ice on or Around Railroad Cars" and "Sanitation in Connection with Car Toilets, Laboratories, Coach Yards, etc." Under the first head, the circular discusses source of water, hydrants, water hose, hose nozzle, car filling connections, car water systems, coolers, filters, water buckets, and the handling of ice. The second part of the circular deals with car toilets and laboratories, soil cans, car refuse disposal, and general sanitation at terminals and coach yards.

Small Railway Drinking Water Supplies

In a brief report submitted as information, and as complete, the committee discussed the essential features of the construction and maintenance of wells to guard against their contamination, and then pointed out the importance of and methods of preventing the contamination of well water during construction or repair operations.

The latter part of the report was given over to methods of disinfecting contaminated waters, including direct chlorination; the use of calcium and sodium hypochlorites; the use of alum or copperas alone, followed by filtration; the use of activated carbon; purification by ultra-violet light; the metallic silver method; and distillation. The newest of these methods, as pointed out in the report, is the use of metallic silver, which, in the opinion of the committee has a number of distinct advantages.

Classification of Water Service Material

In a final report, submitted as information, the committee went into considerable detail to show the magnitude of the water supply problem on the railways, and then discussed the classification of water service materials and equipment, and the relationship which should exist between the purchasing department

and the using department in the purchase, handling, and use of water service supplies in the most effective and economical manner.

Concerning the magnitude of the railway water service problem, the committee quoted Interstate Commerce Commission reports to the effect that during 1936, the Class I railroads of the United States spent \$5,860,164 for maintaining water stations, \$15,900,521 for water for train locomotives, and \$3,326,531 for water for yard locomotives. In addition, according to the report, the Class I roads, in 1935, spent \$4,362,142 for additions and betterments to water stations.

In a further effort to show the magnitude of water service functions on the railways, the report continued with a detailed statement of the water service department purchases on one road, and then stated that it is estimated roughly that the aggregate purchases made by the railways of the United States in connection with the maintenance, operation and improvement of their water services exceed \$19,000,000 a year, including \$1,600,000 for pumps, \$950,000 for power units, \$2,500,000 for water tanks, \$600,000 for water columns, \$3,200,000 for cast iron pipe, \$1,500,000 for wrought iron and steel pipe, \$790,000 for valves, \$6,700,000 for chemicals for water treatment, \$169,000 for hydrants and accessories, and approximately \$1,100,000 for rubber products.

The main body of the report dealt in detail with the relationship that should exist between the purchases and stores departments of the railways and the technical using departments in the purchase, storage and use of water service supplies and materials, and then discussed the various factors entering into the proper classification of water service materials and methods of keeping records, which it pointed out are essential to the most economical purchase of such materials, and to their most effective use. At the end of its report, the committee offered a group of conclusions and recommended that the report be submitted to the Purchases and Stores division of the Association of American Railroads for study and comment.

Appended to the report, the committee presented those sections of the standard classification of materials recommended by the Purchases and Stores division, A. A. R., in which most of the water service materials used on the railways are found.

Following the presentation of this part of the report, C. H. Murrin, general storekeeper, (L. & N.), representing Division VI, Purchases and Stores, presented a written discussion on the classification of water service material, which will be incorporated as an appendix to the report as it is printed in the proceedings.

Uniform General Contract Forms

W. G. Nusz, Chairman*

No revisions of the Manual were recommended by the committee, one form was submitted for inclusion in the Manual and progress was reported on the two remaining assignments.

Store-Door Delivery and Pickup

The committee submitted a tentative form of agreement for pickup and store-door delivery, in 1936, and after further study presented this year a revision of this form for inclusion in the Manual, which, the committee stated, contains the essential terms needed to be included in such a contract. The form embodies provisions for contractor's equipment, delivery of freight, freight in contractor's possession, protection of freight, collection of freight charges, bills of lading and delivery orders, inspection of accounts, permits and licenses, compliance with laws, form of payment of freight charges, charges to other carriers, damage and injury to persons and property, defense of lawsuits, affiliation with another carrier, payments to contractor, employees of contractor, insurance, adjustment of claims, refunds, written notices, breach of agreement, assignments, and approval by public authorities.

The form recommended by the committee was adopted for inclusion in the Manual.

Other Subjects

Prior to the activities of the federal government with respect to grade crossing elimination, the committee was requested to

* Assistant Engineer, Illinois Central.

prepare a form of agreement for grade separations. The committee submitted a tentative form in 1935, but reported that it was as yet unable to submit a final form for approval. The committee reported progress on the preparation of a form of agreement for commercial signs on railway property.

Report on Roadway

Geo. S. Fanning, Chairman*

The committee reported in detail upon five of its nine assignments, and offered Manual material with regard to waterways and tunnels, and the physical properties of earth materials.

Physical Properties of Earth Materials

The committee presented new materials for inclusion in the Manual under Article 101—General; Article 102—Physics of Soils; and Article 103—Roadbed. Article 101 deals largely with the scope of the problem of soil mechanics as it affects the railways, and then discusses the importance of the proper selection or treatment of roadbed soils to the economical maintenance of track and the operation of trains.

Article 102 covers the origin and types of soils, their physical properties, and their proper classification, and defines such basic properties as internal friction, cohesion, compressibility, elasticity, permeability and capillarity. This article also describes the physical characteristics of the basic textural groups of soils, such as sand, loam colloids, muck, etc., and includes a classification chart devised by the United States Bureau of Public Roads for the uniform classification of soils. At the end of the discussion of the physics of soils, special attention is given to the physical properties of compressibility, permeability and shearing strength, as those properties with which the engineer is most concerned.

Under Article 103—Roadbed, the report discusses the behavior of various classes of soils, the effects of moisture, consolidation, lateral flow, and frost action.

Since the new material submitted for adoption includes practically all of the important factors now contained in Articles 504A and 504B in the Manual, the committee recommended appropriate revisions in these articles to avoid duplication.

All of these recommendations were adopted.

Natural Waterways

In its study of this subject during the year, the committee gave special attention to those phases having to do with drainage areas, water run-off and size of openings, and, as a result, presented two new articles, Nos. 201 and 202, dealing with these phases, which it recommended for adoption and inclusion in the Manual. Article 201 covers the scope of the problem of natural waterways as it affects the railways, and points out that properly designed openings, the control of flood flows and the protection of the roadway and structures are of vast importance from the standpoints of safety, economy and the continuance of train operation during flood periods. Article 202 deals specifically with the proper method of making field surveys in connection with waterway openings, and includes a list of items which the committee felt should be considered in order that the survey notes will include all of the information necessary for the design of the most suitable structures for waterway openings. Both articles were adopted without discussion.

Culverts

In a progress report on the subject, the committee presented for consideration a new article, No. 301, dealing with the location and type of openings required under various circumstances. In this article are discussed the size of waterway required; the span required; the character of hydraulic traffic (i.e., abrasive, corrosive, etc.); topographic conditions determining angle, gradient and length of structure; foundation conditions; height and character of embankment; live and dead loads; and the economics of various types of openings.

Supplementing the report, which had to do largely with new culvert construction, B. R. Leffler (N. Y. C.) pointed out the practicability and economy of inserting cast iron culvert pipe within old failed culverts, and cited several examples where the

work was done effectively and at small cost as compared with tearing out the old culvert and rebuilding it. He also pointed out that often, in spite of the theoretical size of opening called for by the drainage area involved, the somewhat smaller area resulting from introducing a pipe within a failed culvert, is entirely satisfactory and will save large amounts of money.

Width of Roadbed and Angle of Slopes

The report on this subject, submitted as a progress report, was confined to recommendations concerning the proper widths and slopes of the roadway on fills and through cuts. These were considered separately because the committee felt that, in spite of the fact that widths and slopes are interdependent to the extent that the stability of the roadway may be increased by providing either a greater width or flatter slopes, most of the controlling factors are not the same.

Under the subject of widths, the report dealt with the effect of the ballast section and type of ballast employed, erosion and settlement and other factors which affect the width necessary, and then discussed standard widths in use on the railways at the present time, basing this discussion upon information received from the railways in answer to a questionnaire. The information received showed considerable variation in standard widths. For fills on principal lines, the narrowest standard reported was 18 ft. and the widest 24 ft., with the weighted average 20 ft. 6 in. For secondary lines, the minimum width reported was 16 ft., and the maximum 22 ft., with a weighted average of 17 ft. 6 in. The report then discussed the height of fills, subsidence, and other factors that affect the width of fills, and dealt with the advantages of wide cuts and the importance of adequate drainage.

Under the heading of slopes, the report dealt primarily with the effect of erosion and weathering; slides; the relative advantages of wide cuts and flattening slopes; and terracing, and then discussed briefly the most effective and economical slopes to be used in various classes of rock. At the end of its report, the committee offered a group of seven conclusions embracing the more important factors included in its discussion.

Tunnels

The committee presented for adoption and inclusion in the Manual new specifications for the construction, excavation and temporary lining of tunnels, formulated as the result of careful study of the specifications employed in the construction of a number of existing tunnels on the railways. It pointed out that it had been impossible for it to prepare a general specification which would cover special cases of tunnel construction and peculiar local conditions, and that the specifications offered, therefore, are intended to cover only ordinary tunnel construction.

The new specifications; intended to replace material formerly included in the Manual under specifications for the formation of the roadway, but deleted in recent revisions of the Manual, present the subject under the following subject heads: General, laying out work, sanitary provisions, excavation, change in area on account of curvature, slides and falls, excavation below grades, refuge niches, shafts, classifications of excavation, disposition of material and overhaul, wiring, blasting, ventilation, drainage, timber lining, packing and portals.

W. A. Radspinner (C. & O.) said that the requirement in the specifications concerning wiring should refer to the National Electric code. Sub-committee chairman F. W. Alexander (C. P. R.) agreed to incorporate the change suggested, but called attention to the fact that all of the wiring referred to was of a temporary character. With this change, the specifications were adopted.

Signs

The committee made no detailed report on this subject, but did give special consideration to clearance signs to be used where lateral and overhead clearances are less than statutory requirements, based upon a request for early recommendations received from the Association of American Railroads. Owing to the fact that the request in this matter was not received until August 8, 1937, the committee, to the time of submitting its report, did not have time to collaborate with the Special Committee on Clearances, but it did draw up a group of three conclusions with regard to proper clearance signs, based largely around the results of its discussion of this subject with representatives of

* Chief Engineer, Erie.

the Railroad and Warehouse Commission of Minnesota, which was currently giving this matter special attention.

The conclusions submitted by the committee call for easily read signs with simple wording such as "Warning Close Clearance" or "Close Clearance"; and for placing the signs on the structures involved directly at the points of close clearance. The committee saw no advantage in the use of self-illuminated or reflector button signs to warn of close clearances.

G. R. Westcott (M. P.) called attention to the varying laws in the different states with regard to the location and wording of clearance signs, and said that this must be borne in mind, in spite of the committee's recommendations. Chairman Fanning recognized this situation, and said that it was this fact which had led the committee to be general in its recommendations with regard to wording, size and location.

Bernard Blum (N. P.) said that he saw real value in setting up a standard sign which could be used to secure general adoption by the various states. He said that such a standard sign would be particularly valuable for use at jointly-operated terminals and other facilities. Chairman Fanning conceded the value of a general standard sign for many locations, but said that in setting up too definite a standard, certain roads might be forced to replace thousands of existing signs, and in the event that they did not, might get themselves into serious difficulties in the event of an accident.

Other Subjects

In addition to the subjects already commented upon, the committee during the year gave consideration to the following subjects on which it made no report: The structural bearing power of earth materials; roadway drainage; roadway protection; and railroad fences.

Report on Ballast

A. D. Kennedy, Chairman*

The feature of the committee's report was the presentation for adoption of plans for four new ballast sections for single and double track on tangent. No revisions were recommended in Manual material, but the committee reported considerable progress in collecting information to assist it in its study of the relationship between the behavior of ballast materials in service and results obtained by the Los Angeles testing machine.

Ballast Section Design

The committee offered for adoption and inclusion in the Manual four ballast sections designed for tangent track in single and multiple-track territory. Ballast sections designated Nos. 1 and 2 are for prepared ballast materials, including stone, slag and gravel having more than 20 per cent crushed particles, Section No. 1 being intended for use where sub-ballast is required, and Section No. 2 for use on roadbed not requiring sub-ballast. Sections designated Nos. 3 and 4 are for prepared gravel with 0.0 to 20 per cent crushed particles, and for pit run gravel, Section No. 3, being for use in connection with sub-ballast, and Section No. 4 for use where no sub-ballast is required. All four section drawings are accompanied by tables of variable dimensions and quantities.

The four ballast sections and tables were approved for inclusion in the Manual.

The committee reported that it is now working on ballast section designs for curved track, which it plans to submit for consideration next year.

Report of Committee on Ties

John Foley, Chairman†

Seven assignments were reported upon by the committee, all having to do with the manufacture, treatment or service life of ties. No recommendations were offered concerning new ma-

terial for the Manual, or with regard to revisions of existing material in the Manual.

Revision of the Manual

The committee discussed criticisms directed at it that the latest specifications of the association for crossties are not being followed as generally as might be hoped, and defended the position which it has taken that even though there is deviation from the present standards, largely because of special considerations, there should be no downward revision in the specifications to secure their more general adoption. It said that the specifications sponsored by the committee are recommended practice in attainable standards, and pointed out as evidence that they are not too advanced for practical application, the fact that millions of ties are being obtained annually under inspection governed by the specifications. It admitted deviations from the specifications and the reasons offered therefor, but said that after considering all conceivable suggestions for downward changes, it is still of the opinion that the present standards should not now be revised.

Adherence to Specifications

The committee based its report this year largely upon its examination of more than 700,000 ties accepted by seven railroads, and located at five commercial wood-preserving plants. The producing territories represented by these ties comprised the New England states, Virginia and the South Atlantic states.

In commenting upon its observations, the committee stated that it found conditions at some points not conducive to the proper seasoning of ties, and also questioned deviations in practice as regards grading and branding. However, it said that it found circumstances responsible for these conditions at certain points and that the majority of the ties observed were in full accordance with the A. R. E. A. specifications. This, it said, showed that the requirements of the specifications can be met for any railroad which inspects its ties on this basis. All that is necessary, it pointed out, is careful application by the railroad of the dimension and quality stipulations in the standard specifications to insure best practices and quality ties.

Substitute Ties

Resuming a practice discontinued during the last two years, the committee presented a summarized statement of the tests of substitute ties being conducted on a number of roads. The roads reported as making tests include the Atlanta & West Point; the Bangor & Aroostook; the Bessemer & Lake Erie; the Canadian National; the Delaware & Hudson; the Duluth, Missabe & Iron Range; the Elgin, Joliet & Eastern; the Lehigh & New England; the Newburgh & South Shore; the Norfolk & Western; the Pennsylvania; the Reading; the St. Louis-San Francisco; the Southern Pacific; the Terminal Railroad Association of St. Louis; and the Los Angeles Railway. The ties represented in the various tests include steel and concrete ties, and ties of a combination of these materials.

Tie Renewal Statistics

Again, to meet the desires of the railways for early publication of the facts and figures brought together yearly by the committee with regard to tie renewals and costs on the various railways, the committee issued its report on this subject in Bulletin 396 (abstracted in the *Railway Age* of September 11, 1937). The figures shown in the report are the 1936 tie renewal statistics as reported to the Interstate Commerce Commission.

Commenting upon the concern expressed with regard to possible misunderstanding of the cost figures included in Table A of the report, the committee pointed out that the average cost as reported in Columns 3 and 5 of Table A do not represent the actual costs of the ties purchased during the calendar year, but rather are the storekeeper's average costs of the ties charged out and used during the calendar year.

Proper Seasoning of Oak Ties

During the last three years, the committee has had under observation sample stacks of oak ties at various places to ascertain if the method of stacking them has any effect upon their tendency to split while seasoning for treatment. Carefully-conducted tests were made at the wood-preserving plant of the

* Assistant Engineer, Atchison, Topeka & Santa Fe.

† Forester, Pennsylvania Railroad.

Santa Fe at Wellington, Kan., which tests are described in the committee's report.

As a result of its observations, the committee stated that the test stacks do not indicate that splitting is reduced by close spacing and, furthermore, that the behavior of the ties in the various stacks confirms in a general way the conclusion in this respect drawn from earlier tests made elsewhere.

Effect of Traffic on Tie Life

Recognizing that when comparisons are made between tie renewals on different roads, or between renewals in different years on the same road, the question of volume of traffic is a factor which should be given consideration, the committee during the year attempted to ascertain the relative importance of this factor. As outlined in its report, it attempted to use the tie renewal statistics and traffic density data published each year since 1929 in arriving at an answer to this problem. Because of the unusual disturbances caused by the depression, however, it found that there was not only a wide fluctuation in traffic in these years, but also in tie renewals, which greatly complicated its analysis.

In carrying out its work, certain representative roads, a total of 24, were selected for study. For each of these the simple averages of traffic densities and tie renewal percentages for the 8 years, 1929 to 1936, inclusive, were obtained, and the roads were arranged in tabular form according to their average traffic densities for these years. All of the roads included in the tabulation make practically all renewals with creosoted ties.

From the traffic and renewal data tabulated, an attempt was made, without success, to plot a curve showing the relationship between the two factors, it being evident at once that there were variable causes, other than traffic density, which have important effects upon tie renewals. The simple average density for the 24 railroads listed was 5,360,000 gross tons per mile of track. The average tie renewals for the 11 roads having densities of traffic greater than this average was 3.08 per cent, whereas the 13 roads with densities less than the average renewed 3.31 per cent of their ties in the average year. In view of its findings, the committee concluded that data available at present are insufficient to permit a satisfactory determination of the relationship between traffic and tie renewals, and recommended that the subject be dropped for the present time.

Re-Use of Treated Ties in Track or Elsewhere

With the thought that additional experience in the use of second-hand ties might now be available and of value, the committee gave consideration again to this subject, which was reported upon last in 1933, and sent a questionnaire to various railways. In its report, it summarized briefly its findings, particularly as regards the uses being made of ties released in main line renewals and from abandoned tracks and stated that it is the opinion of most of the roads reporting that the greatest economy is obtained by wearing out a tie in its original position when practicable. Furthermore, it is generally agreed that no tie should be reused in track unless it is estimated to give at least five years of service in its new location; that such ties should be applied as soon as possible in order to minimize loss of preservative; and that they should be used in tracks where the cost of installation is low. All of the information received was in general accordance with the recommendations of the committee as presented in its report for 1933.

The report was received without comment.

Report on Track

C. J. Geyer, Chairman*

The committee presented reports on nine of its assignments, all having to do with features of the track structure, including frogs, switches, special trackwork, rail fastenings, tie plates, rail lubricators and track tools. In addition, it reported progress in its study of four other subjects.

Switches, Frogs, Crossings, Slip Switches, Etc.

During the year, the committee continued its work on the

* Engineer Maintenance of Way, Chesapeake & Ohio.

preparation of detailed plans covering curved switches, and, as a result, presented the following plans containing all of the necessary details for the construction and application of 30-ft. and 19-ft. 6-in. curved switches, which it recommended for adoption and inclusion in the Manual:

Plan 123—19-ft. 6-in. Curved Split Switches With Uniform Risers.

Plan 124A—Location of Joints for No. 7 and No. 8 Turnouts With 19-ft. 6-in. Curved Switches.

Plan 124B—Location of Joints for No. 9, No. 10 and No. 11 Turnouts with 19-ft. 6-in. Curved Switches.

Plan 125—30-ft. Curved Split Switches With Uniform Risers.

Plan 126A—Location of Joints for No. 12 and No. 14 Turnouts With 30-ft. Curved Switches.

Plan 126B—Location of Joints for No. 15 and No. 16 Turnouts With 30-ft. Curved Switches.

In addition, the committee submitted for adoption, Plan No. 140—Method of Beveling Heel End and Rounding Stock Rail Side of Split Switch Points, which illustrates the practice which the committee considers most desirable. It also presented for adoption, specifications for heat-treated rail for special trackwork, which specifications are intended to be added to the portfolio of A. R. E. A. trackwork plans.

These plans and specifications were adopted for addition to the portfolio of trackwork plans.

In view of reports of unsound metal below the running surface, and of cracks in the vertical walls of solid manganese steel frogs, usually in the vicinity of the cross ribs and the bolt shrouds at the toe or heel, the committee made a study of Plan No. 640 covering data and sections for solid manganese steel self-guarded frogs, and Plan No. 670 covering data and sections for solid manganese steel frogs, and instigated an investigation and tests as to the cause of these failures. In the tests conducted, which were described in the report, an attempt was made to determine the relative value, as reinforcement, of cross-ribbing on the underside of the frog castings. The results of the tests indicated two factors of importance—that cross-ribs and bolt shrouds attached to the floor of the castings are inductive to producing cavities of more or less magnitude, and that S-shaped ribs unattached to the floor of the castings will insure sounder castings.

As the result of its findings, the committee recommends that A. R. E. A. Plans Nos. 640 and 670 be revised as follows:

That cross-ribs attached to the floor of castings be replaced by S-shaped ribs unattached to the floor at approximately the same locations; and that bolt shrouds be omitted at the heel of all frogs; at the toe of Design No. 1 frogs for rail 6 in. or higher (S-shaped rib to be introduced in the body between first and second joint holes in (a) and (b)); and at the toe of Design No. 2 frogs and self-guarded frogs.

This latter part of its report, with regard to the design of solid manganese steel frogs, was submitted as information.

Steel Tie Plates

The committee prepared and recommended for adoption and publication in the Manual, new specifications for hot-worked carbon-steel tie plates. These specifications, which were published in full in the report, covered method of manufacture, chemical properties and tests, workmanship and finish marking and inspection, and rejection.

Welding of Manganese Trackwork Castings

Following the presentation of historical data relative to the discovery and early production of manganese steel and the development of the practice of welding in the repair of manganese steel castings, the report on this subject was a detailed treatise on the metallurgy of manganese castings, the metallurgy of welding, the method of welding manganese castings, the equipment available for welding, and the economies which are possible through the repair of manganese track castings by means of welding. As a result of its detailed study of this subject, the committee presented the following conclusions which it recommended for adoption and inclusion in the Manual:

(1) The welding of manganese track castings by the electric arc process is entirely practical and economical and has saved the railways many thousands of dollars.

(2) Proper technic in the application of welds to manganese trackwork is most essential.

- (3) Efficiency and up-to-date equipment should be used.
 - (4) Manganese track welding should not be attempted by untrained men.
 - (5) Care must be used in the selection of welding rods.
- The conclusions, with two slight amendments suggested by the committee, were approved for inclusion in the Manual.

Lubrication of Rail on Curves

The report on this subject was relatively brief and dealt largely with the various methods of lubricating rail on curves, and the basis of determining the justification for the installation of mechanical lubricators in track. Stated briefly, the committee found that track-type lubricators have distinct advantages over mechanical lubricators installed on locomotives, but that much study must still be made to determine the proper location of lubricators in track with respect to the territory to be lubricated; the effective distance the lubricator will carry; the relation between degree of curve and the increased life of the rail lubricated; decreased train resistance with respect to tonnage and curvature; decreased wear on engine tires; and the kind of lubricant best suited.

The committee stated that several roads have accumulated cost data on lubricators and on the increase in life of rail on curves, and that tables have been prepared to be used as a guide in determining the economy of lubricators, but that in all cases these tables take into account only the increased life of the rail, and do not give consideration to the important savings due to decreased locomotive driver flange wear, the increase in the life of ties as the result of decreased gaging, and less resistance to train movement. In its later studies the committee hopes to ascertain the relative advantages of these factors.

With information available only as regards the effect of lubricators in increasing the life of rail, the committee presented a sample method of determining whether a lubricator is justified in a specific location. It also presented, as information, a somewhat different method of determining the economics of rail lubricators used by one road, which takes into consideration the original cost of the oiler; its annual maintenance cost, including repairs and grease; the rate of interest on the investment; the life of the oiler; annual charges for replacement; the life of rail not oiled; the life of rail when oiled; the length of the curves involved; the cost of installing the rail, including labor; and the salvage value of the rail released.

R. F. Ford (C. R. I. & P.) emphasized the importance of further research in the economics of rail and flange lubrication, because of the spread in speed that is occurring between passenger and freight trains by reason of the introduction of high-speed passenger service.

Design of Out Track Spikes

In view of the length of the point, or toe, of the present standard cut track spike, which makes it impossible to drive this spike correctly where toeless joint bars are involved, without turning the spike around, which has certain disadvantages, the committee presented as information a modified design of track spike for use in connection with toeless joint bars. The modified design, which the committee stated has been used extensively by a number of roads with complete success, has a much shorter toe than the standard design, and has a greater overall length to compensate for the thickness of the joint bar which is gripped by the head. In other respects it is essentially the same as the standard spike.

Plans and Specifications for Track Tools

The committee prepared and offered for adoption, Plan 23-A—Rail Tongs for Use with Cranes, which plan was offered as information last year. It also presented for adoption, Plan 26—Scoops for Use of Trackmen, which was submitted originally for consideration in 1936. In addition, the committee submitted as information, for criticism, new standard plans for a wood center track gage; a track level and elevation gage; a 26-in. sycythe; a snath; and a spot board.

Plans 23-A and 26 were adopted for inclusion in the Manual.

Fastenings for Continuous Welded Rail

The committee, collaborating with the Committee on Rail, continued its study of the various types of fastenings which are being used with continuous welded rail, enlarging its study this

year to include several types of fastenings which have not been used for this purpose as yet. It reported that information is being collected concerning the holding power of these various fastenings and also as regards the amount of holding power necessary in a fastening employed with continuous welded rail. It also reported that it is collecting data bearing upon the design of the most effective screw spike for securing tie plates to the ties.

Revision of the Manual

As the result of new plans approved, the revisions and re-issue of other plans, and revisions desirable in current plans and covered by notation on erratta sheets, the committee recommended the re-issue of Appendix E of the trackwork plans to bring it up-to-date. The committee also made revisions in and re-issued the following plans, copies of which were included with its report: Plan 128—Locations of Joints for No. 18 and No. 20 Turnouts with Curved Switches; Plan 320—Data and Sections for Bolted Rigid Frogs; Plan 600—Data and Sections for Rail-bound Manganese Steel Frogs; Plan 640—Data and Sections for Solid Manganese Steel Self-Guarded Frogs; and Plan 670—Data and Sections for Solid Manganese Steel Frogs. Further along in its report, the committee recommended revised serial numbers for a number of plans, and changes of more or less importance in Plans 101 to 108, inclusive, 127, 258 to 269, inclusive, 273 to 279, inclusive, 281 to 283, inclusive, 291, 292, 345, 643, 651 to 656, inclusive, 793 and 920. Certain revisions were also recommended in Appendix A of the trackwork plans.

All of the revisions were approved.

Other Subjects

In addition to the subjects reported on in detail, the committee stated that progress had been made during the year in the study of the corrosion of rail and fastenings in tunnels; the practicability of using reflex units for switch lamps and targets; the proper tension required in track bolts of rail joints; and the prevention of the dripping of brine on track structures.

Report of Committee on Highways

J. G. Brennan, Chairman*

Reports were presented upon four of the eight assignments to the committee, in which the committee presented for adoption new "Gates-Not-Working" and "Watchman-Not-On-Duty" signs, and a series of requisites for automatic crossing gates.

"Gates-Not-Working" and "Watchman-Not-On-Duty" Signs

Without making comment, the committee submitted for adoption and inclusion in the Manual drawings covering a "Watchman-Off-Duty" sign and a "Gates-Not-Working" sign, both of the reflector type. In addition, it presented for adoption a drawing showing the recommended mounting for reflector signs, and another drawing of a recommended metal cover plate for signs, intended to be placed over signs, the meaning of which is to be nullified temporarily. All of these signs, except that with regard to the recommended mounting for reflector signs, were submitted as information and for criticism last year. This year they were adopted for inclusion in the Manual.

Automatic Crossing Gates

As a result of a questionnaire, the committee presented a tabulation of the roads using automatic crossing gates, which showed the number of crossings protected, the type of gates used, whether electric or hydraulic, and whether flashlights are used in conjunction with the gates. Ten roads were included in the tabulation, which have a total of 37 automatic gate installations, of which 13 are electrically operated and 24 hydraulically operated.

In addition, the committee reported, briefly upon its inspection of an installation of automatic gates on the Erie, involving four gate arms, each with a red light attached, and operated in conjunction with standard flashlight signals.

Barrier Type of Protection, Including Gates

The committee reviewed carefully the requisites for automatic crossing gates presented last year as information. As a result,

* Engineer Grade Crossings, Association of American Railroads.

it submitted a revised series of 17 requisites for these types of gates, which were recommended for adoption and inclusion in the Manual. Among the factors covered in these requisites are the position of the gates when open and when closed; the aspect of the gate arms when in restrictive position; the use of flashing light or wigwag type signals in conjunction with the gates; the mounting of the gate arms; lights required in conjunction with the gates; the painting of the gates; details of operating mechanisms and control circuits; and marking of the highway lanes in the vicinity of crossings. These requisites were adopted.

Lamps on Manual and Automatic Gates

In a brief report, submitted as information, the committee presented recommendations with regard to the lighting of manually-operated and automatic crossing gates, where electricity is available and when oil lamps must be used. It reported that the specific design of electric light to be used where electricity is available at a reasonable cost, is to be worked out by the Signal section of the Engineering division of the A. A. R.

Other Subjects

In addition to the subjects reported upon, as noted above, the committee stated that progress had been made in the study of the economic aspects of grade crossing protection in lieu of grade separation; the design of and specifications for highway crossings at grade over railway tracks, the best method of classifying grade crossings with respect to hazards involved; and revision of the Manual.

Report of Committee on Stress in Track

Dr. A. N. Talbot, Chairman*

The report submitted on this subject was a synopsis of the field and laboratory tests which are being carried out by the committee in co-operation with the American Society of Civil Engineers, the Association of American Railroads, and two roads in particular, the Pennsylvania and the Atchison, Topeka & Santa Fe. Tests of rail joints under high-speed train operation occupied the major part of the time of the committee's staff during the last year.

As pointed out in the report, track tests were carried out at Elkton, Md., on the Pennsylvania, employing magnetic strain gages of the type used in previous studies by the committee; two new types of magnetic strain gages, used for the measurement of movements between parts of a rail joint, where the movements are larger than those resulting in rail strains; solenoid depression gages, to measure rail depressions at high speeds; and oscillographs.

Tests were made with joint bars of different kinds and classes, representing variations in section from near-symmetrical bars to angle bars, and including bars with controlled bearing surfaces and head-free bearing. Certain bars were tested in long and short lengths. In addition to the tests on rail joints, tests were made with certain track and equipment conditions, such as battered rail, flat wheels, eccentric wheels and various locomotive counter-balancing, to learn something of the effect of these conditions on rail stress and depression. According to the report, the reduction of the large amount of field data secured at Elkton, already well under way, will take a considerable period of time.

Other tests commented upon in the report were those carried out on sections of continuous welded rail on the Delaware & Hudson, at Schenectady, N. Y., and on the Bessemer & Lake Erie, near Pittsburgh, Pa., and the rail joint tests under way on 12 miles of track on the Pennsylvania, and on 9 miles of track on the Santa Fe. No new data were presented concerning the continuous rail tests, and members of the association were referred to the current report of the Committee on Rail for detailed information concerning the joint test installations on the Pennsylvania and the Santa Fe.

The committee reported that construction has been started in the shops of the University of Illinois on a 33-in. stroke rolling load testing machine for the laboratory study of rail joints, and

* Professor Emeritus, University of Illinois.

that the work on this machine is being carried forward as rapidly as conditions will permit.

In presenting this report, Dr. Talbot gave a detailed account of the work of the committee during the past year and, with the aid of numerous charts, described the results of the tests of joint bars on the Pennsylvania, observations of the continuous welded rail on the B. & L. E. and the D. & H., and the service tests of various types of joint bars on the Santa Fe and the Pennsylvania.

The report was received without comment.

Report of Committee on Rail

J. V. Neubert, Chairman*

The committee presented reports on nine subjects having to do with rail and allied matters, together with a final report on the effect of the contour of the head of rail sections on wear, and submitted three new rail record forms which it recommended for adoption. The report, as in the past, included statistics concerning rail failures of various kinds, both service and detected, as of December 31, 1936. Progress was reported in the study of the economical value of different sizes of rail and specifications for relayer rail.

Revision of the Manual

Under this assignment, the committee prepared and submitted two forms for keeping record of the location of the heat numbers of rail in track, one of these being intended for recording in the field, by miles, such data as heat numbers, ingot numbers and rail letters of the rails consecutively as they lay in the track, and the other intended for use as a division office record, to be filled out from data obtained from the field record.

In addition to these two forms, the committee presented an additional form with regard to the controlled cooling of rails, which is intended to be used by the representative of a railroad company at the rail mill for recording temperatures, rate of cooling and other necessary data during the process of the controlled cooling of rail. The recommendation of the committee that all three forms be approved for inclusion in the Manual, was adopted.

Research on Rail Mill Practice and Manufacture

The report of the committee was a brief synopsis of the work which has been carried out under its direction during 1936 and 1937, collaborating with the Rail Manufacturers' Technical Committee, and also as regards the plans for its investigation work through 1938. Reviewing its work during 1936 and 1937, the committee referred briefly to its Third Progress Report submitted at last year's convention, and also to its field tests for wheel loads in service, acceptance tests of rails, and the study begun with regard to the end-hardening of rails. It directed attention also to the work done with regard to the temperature limits for the controlled cooling of rails, and also to several miscellaneous studies and tests concerning rail failures.

According to the report, the committee plans during the year ahead to concentrate its attention largely upon the further study of limiting temperatures for the effective controlled cooling of rails, and upon rail batter tests and rail-end hardening processes. In its study of controlled cooled rails, it plans further mill tests, and reported that it is considering also a series of tests to determine the effect of the addition of hydrogen to molten steel in the controlled cooling process in minimizing shatter cracks. Most of its work with regard to rail-end hardening has been concerned with mill processes, whereas, in future study, consideration will be given to the various methods of end hardening being carried out in the field.

The committee reported that it contemplates no further extensive field tests on rails, but that it plans to continue the study of non-destructive tests for detecting shatter cracks in rails, and studies of the effect of track conditions, and of the condition of rolling stock upon the failure or destruction of rail.

Rail Failure Statistics

The report on this subject was presented by W. C. Barnes, engineer of tests for the committee. The statistics included,

* Chief Engineer Maintenance of Way, New York Central.

which were as of December 31, 1936, were compiled, as formerly, in accordance with the standard manner of basing the failure rates on mile-years of service in track. Of special interest were the statistics with regard to the average failures per 100 track miles of rail which occurred in 1 to 5 years service, these statistics showing that as regards the 1931 rollings for the five-year period 1932-1937, there was an average of 67.4 failures per 100 track miles, which is an increase of 7.4 failures as compared with the rate reported last year for the 1930 rollings. Both service and detected failures are included in these figures.

As in past years, the report contained an analysis of rail failures with respect to the rollings of the different mills, and a number of tables, diagrams and charts showing the trend in failure rates. The mill comparison tables submitted again showed for the years covered the failure rates as regards both service and detected failures.

Transverse Fissure Statistics for 1936

The report of the committee, presented by Mr. Barnes, constitutes a cumulative record of transverse fissure failures, by mills and roads, which have been reported up to and including December 31, 1936. Some of the more important data presented include the total fissure failures reported each year since 1919; transverse fissure failures reported by individual roads; and fissure failure rates in rails by years rolled and by mills.

According to the report, 8,020 detected fissures and 5,706 service fissures were reported in 1936 as compared with 7,497 detected fissures and 4,867 service fissures reported in 1935. This makes a total of 13,726 fissure failures in 1936 as compared with a total of 12,364 in 1935, which represents an increase of 1,362 failures, or 11 per cent. The report points out that the number of service failures in 1936 is greater than has been reported in any previous year, the nearest approach being in 1929, when 5,260 such failures were reported.

A. A. R. Detector Car

In a brief report on this subject, Mr. Barnes stated that the A.A.R. detector car, operated under the direction of the engineer of tests for the committee, had had a busy and profitable year. He said that the demand for the services of the car have been such that it is usually leased eight months in advance of delivery on a road. It is for this reason, he pointed out, that it has been impossible for the committee to meet the numerous requests for emergency use of the car.

Rail Battering and Methods of Reconditioning Rail Ends

In a brief report, the committee stated that it has had the assistance of those conducting the rails investigation at the University of Illinois in making laboratory studies of samples of rail-end hardening as done by various methods both at the rail mills and in the track. For information on the results of these studies to date, members were referred to the quarterly reports of the Rails Investigation Committee. However, it reported that the laboratory work on the samples submitted is so well advanced that it is now possible to proceed with the selection of the more promising methods to be included in the more extensive field tests to be carried out.

Rail Lengths in Excess of 39 Ft.

The report was divided into three parts, dealing essentially with the attitude of the various railways with regard to longer standard lengths of rail; the test installation of 78-ft. rails on the Kansas City Southern; and the economic advantages of 78-ft. rail.

In dealing with the first subject, the committee presented as Exhibit A, the results of a questionnaire which, among other things, showed that of the 58 roads replying, 21 were in favor of 39-ft. rails; 18 favored 78-ft. rails; 10 favored 45-ft. rails; 3 favored 66-ft. rails; 1 favored 50-ft. rails; 1 favored 58-ft. 6-in. rails; 1 favored 117-ft. rails; while 3 expressed no preference.

As regards the installation of 78-ft. rail on the Kansas City Southern, the committee described the installation in considerable detail. This installation extends over one mile, and is laid with rails of 127-lb. Dudley section. The rail was rolled in accordance with current A. R. E. A. specifications, except for certain modifications pointed out in the report, and was controlled-cooled and end hardened.

In its description of the installation, the committee discussed the loading of the rail for shipment; its unloading at destination; the laying of the rail; details of the track structure involved; the special arrangements made for recording the desired field observations; and then presented a number of comments on such observations as have been made up to the present time.

In its consideration of the economic advantages of 78-ft. rail, the committee made a comparative study of the respective advantages of these longer rails with present 39-ft. rails, taking into consideration first cost, laying costs and joint maintenance costs. As a result, as shown in the report, the net savings in the case of 78-ft. rail would represent a total benefit in capital investment, at 5 per cent interest, of \$6.20 a gross ton, assuming that the 78-ft. rail can be obtained at substantially the same base price as 39-ft. rail. It reported, however, that a certain road has made an analysis of the relative cost of 78-ft. rail as compared with 39-ft. rail, using a process somewhat different from that followed by the committee, and has found that the economy in the use of the 78-ft. rail would be \$3.89 per gross ton.

In the remainder of its report, the committee discussed the possible greater damage to rail ends in the event that larger joint gaps are allowed with the longer rail, and offered data which indicated that an increase in the average joint gap from $\frac{1}{8}$ in. to $\frac{1}{4}$ in. would not affect appreciably the wheel impacts developed and should not, therefore, reduce materially the anticipated economies through the reduction of the number of joints where 78-ft. rail is used.

In conclusion, the committee said that many roads, before committing themselves to a longer standard rail length, are giving consideration to their ability to handle long rails with small section crews; the availability of cars for transportation; the effect of rail-end hardening as used with 39-ft. rail; and the developments which are being made in the practice of welding two or more rails together in the field.

Continuous Welded Rail

This report tells of the contract which has been entered into by the University of Illinois and the A.A.R. for the testing of welded rail joints, and advises that a rolling load testing machine has been purchased, and that tests are under way of rail joint welds produced by the gas, Thermit and flashweld methods.

The committee outlined the general procedure to be followed in carrying out the tests which are now being made on welds submitted by the manufacturers of the welds, and indicated that at a later date it may find it necessary or desirable to make tests of actual joint welds taken out of track.

Service Tests of Various Types of Joint Bars

The report of the committee was largely a description of the recent rail joint test installations made under the direction of the committee on the Santa Fe and the Pennsylvania, which includes a discussion of the pre-inspection of the joint bars; observations of the rail laying procedure employed; the measurements made at the joints soon after the rail was laid; and the measurements made at the joints after final surfacing and bolt tightening had been accomplished. The committee pointed out that the observations and measurements made and to be carried out in the future are expected to give information concerning the characteristics of the various types of bars under test, and to bring out in some degree the effects which uniformity or variations in dimensions and fit produced, whether related or not to the form of section and length of the joint bars. Included with its report, the committee submitted diagrams showing the exact locations of the various types of joint bars, and also the various other classes of track material, which are involved in the tests.

Effect of Contour of the Rail Head on Wear

The committee gave consideration during the year to the advisability of a revision in the top radius of the head of the RE 131-lb. rail section, following up this work of last year, which resulted in the adoption of a change in the contour of the top of the head of the RE 112-lb. rail section.

As the result of a questionnaire sent to those roads using RE 131-lb. rail, the committee learned that measurements of the top radius, when the rail is new, vary from 18 to 24 in., whereas measurements made after the rail has been in use for an appreciable period of time show the top radius to be from

11 in. to 14 in. As the result of the information received, in conjunction with the various reasons outlined in its report of last year with regard to revision of the 112-lb. rail section, the committee submitted, as Exhibit A, a revised section for the 131-lb. rail, which it recommended for adoption. The revision made consists of the substitution of a 14-in. radius for the 24-in. radius in the central portion of the top of the rail head, and a $\frac{3}{8}$ -in. top corner radius for the present $\frac{1}{4}$ -in. radius. The revised section was approved.

At the close of the report, Dr. H. F. Moore, research professor of engineering materials, U. of Ill., described the various laboratory tests on controlled-cooled rails, end hardening of rails, rail batter and continuous welding of rails, that are now getting under way at the University of Illinois. These tests have not yet progressed far enough to draw conclusions, particularly since the field tests, which are to supplement them, have not yet been started.

Report of Committee on Clearances

A. R. Wilson, Chairman *

The committee continued its study of clearances as affected by half-through inter-track girders and structures, third rail, signal and train control equipment, and also of new clearance diagrams, collaborating with the various other committees of the association involved, and with the Electrical section and the Mechanical and Operating divisions, but it reported on only one subject, that having to do with revision of the Manual as regards the equipment diagram unrestricted for main lines. In this respect, it stated that Fig. 10, as included in the Manual, page C1-10, was revised during the year and that the Vice-President, Operations and Maintenance department, A. A. R., was so advised, in accordance with the authority given the committee at the 1937 convention, the revisions involved changing the width of the diagram from 10 ft. 7 in. to 10 ft. 8 in., and the distance to top of rail from 4 in. to 2½ in. In conjunction with this latter change, it was necessary to change the width of the diagram at its lowest limits from 7 ft. 6 in. to 7 ft. 4 in.

The report was received without discussion.

Maintenance of Way Work Equipment

G. R. Wescott, Chairman†

The committee presented detailed reports on the standardization of parts and accessories for track motor cars; the depreciation of work equipment; self-contained direct-blow gasoline tampers; the use and adaptability of crawler type tractors for maintenance-of-way work; track welding equipment; and portable power pumps. The report also contained a monograph by C. H. R. Howe on the selection and use of light gas engine oils. No revisions of the Manual were recommended as such, although the report on standardization of parts contained recommendations for certain changes.

Standardization of Parts

After several years careful study and collaboration with interested manufacturers, the committee offered for inclusion in the Manual plans for a 1½-in. axle and ring gage for checking axle dimensions; a design for wheel tread and flange for 16 and 20-in. wheels; typical designs for grease cups; and a design for a shut-off cock for gasoline lines on track motor cars.

It was also recommended that the paragraph in the Manual relating to brake facings be revised to include commercial bar steel as a material for brake facings.

The plans and revision recommended were adopted.

Depreciation of Work Equipment

Under this assignment, the committee gave a complete list of work equipment in common use in railway maintenance, together with its life expectancy and the rate of annual depreciation.

The committee considered depreciation to mean that loss of original usefulness that eventually necessitates replacement of the machine, and that this resulted from wear and tear in service which repairs will not correct, or gradual obsolescence brought about by improvements in design which increase productive output or lessen the cost of operation.

Unit Tie Tampers

The committee reported that unlike other tamping tools in use, which require an external source of power, the direct blow gasoline tie tamper is self-contained and can be used either singly or in groups of any number of tools. The report contained a detailed description of the tool and of its operation. The report also stated that one road reported that in trap-rock ballast 92,053 track feet had been tamped at a maintenance and operating cost of \$0.059 per ft.

Crawler-Type Tractors

Supplementing previous reports on this type of equipment, the committee endeavored to ascertain the extent to which the railways are making use of crawler-mounted equipment of various types. No attempt was made to determine the total number of units owned by all of the roads, but 12 of the roads represented on the committee reported that they have 144 draglines, cranes and shovels; 11 welding outfits on crawler mountings; 27 air compressors; 21 bulldozers; 13 front-end loaders and 4 snow plows, all with tractors to operate them; while 3 tractors without incidental equipment were listed.

One of the arresting features of the report was the wide variety of auxiliary equipment in use, including road graders, trail builders, mowers, slip scrapers, ditchers, snow brooms, snow plows, dipper sticks and shovels, dragline buckets, clam-shell buckets, magnets, hooks, rail dogs, timber hooks, slimmer scoops, bulldozers, pile driver leads, etc. Practically all of the cranes can be converted into shovels, draglines or pile drivers and thus perform all classes of lifting and excavating. The committee reported that the work performed was as varied as the equipment, including the construction of new canals and ditches, the cleaning out of old ditches and of streams at bridges, removing drift, cleaning and widening cuts, widening banks, loading cinders, handling storage coal, coaling locomotives, loading and unloading rail, laying rail, taking up track, loading and unloading miscellaneous stores-department material, loading ballast, unloading refuse, handling scrap by means of a magnet, arc welding, sweeping or plowing snow, operating tie tampers, portable bridge tools, paint sprays, sand blasts, and to load snow.

Electric Welding

After presenting a brief outline of the theory of electric-arc welding for manganese steel, the committee presented a detailed set of instructions for repairing rail-bound manganese frogs, prepared by R. P. Winton, welding engineer, Norfolk & Western.

Portable Power Pumps

Under this assignment the committee discussed in some detail the characteristics of diaphragm pumps, centrifugal pumps and reciprocating pumps, their operation and the classes of work for which they are adapted.

Light Gas Engine Oils

In a summary of the conclusions drawn from a study of light oils for lubricating roadway equipment, it was stated in the monograph by Mr. Howe that no specification relying solely on laboratory confirmation will give any assurance of results to be expected. To be worth while, specifications should contain provisions for definite performance tests.

Other Committees

For reasons pointed out in each case, four committees made no detailed report this year, but each stated that progress had been made in the study of its assignment. These were the Committee on Wood Bridges and Trestles, the Special Committee on Impact, the Special Committee on Complete Roadway and Track Structure, and the Special Committee on Economics of Bridges and Trestles.

The Committee on Wood Bridges and Trestles has the following assignments: Revision of the Manual; simplification of

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† Assistant Engineer, Missouri Pacific.

grading rules and classification of timber for railway uses; overhead wood or combination wood and metal highway bridges; design of wood trestles for heavy loadings; bearing power of wood piles; recommended relationships between the energy of hammer and the weight or mass of pile for proper pile driving; improved design of timber structures to give longer life with lower maintenance cost; review specifications of the American Association of State Highway Officials for overhead highway bridges, insofar as they relate to wood construction; fireproofing of wood bridges and trestles, including the placing of fire stops; and specifications and design of fastenings for timber structure.

The Special Committee on Impact has the following assignments: Testing of short steel spans with open floor, together with the effect of inequalities of the track and the effect of worn wheels on such track; tests of steel spans with ballasted deck, including spans with precast and poured-in-place concrete decks, and also tests on ballasted decks with timber floors; tests of dynamic shear in girder spans with truss spans; tests of impact in columns and hangers of steel spans; tests of rigid frame structures of steel and concrete; and outline of work for the ensuing year.

The Special Committee on Complete Roadway and Track Structure has the two following assignments: Complete roadway and track for various loads and traffic densities; and classification of railways. In presenting this report, J. E. Armstrong, (C. P. R.) chairman of the sub-committee, reported that the committee had completed a classification of main tracks and that the committee expected to have its tentative submissions on the assignment on complete roadway and track structure ready for publication in an early bulletin.

The Special Committee on Economics of Bridges and Trestles is giving consideration to the subject of the comparative economic value of steel, treated timber and concrete in bridges, trestles and viaducts under various conditions of service, with due consideration to the relative influence of durability of materials and obsolescence of property.

Waterways and Harbors

G. P. Palmer, Chairman*

The committee this year reported on only those two of its assignments having to do with levees, dikes and mattresses; and developing the ruling heights and widths in the design of inland waterway craft which control the vertical and horizontal clearances of bridges over waterways. No revisions were recommended in material appearing in the Manual.

Levees, Dikes and Mattresses

Whereas the committee in 1936 presented a final report on that part of its assignment with regard to levees, its report this year was a final report on dikes and mattresses, which it submitted as information, with the recommendation that the subject be discontinued.

In the report, following a statement with regard to the general functions of dikes and mattresses, the committee discussed the problem and aspects of eroding banks, and then went into considerable detail in describing the various types of dikes and their characteristics and uses. Among the types of dikes covered were the screen dike, the abatis dike, the crib dike, the hurdle dike, the permeable pile dike, the retard, jetties and groins.

The remainder of the report had to do with the general character and uses of mattresses in bank protection work or revetment, and under this head the report dealt with types of mattresses, general features of wood mattresses, concrete mattresses, bank paving, standard types and costs, tetrahedral blocks, and reinforced asphalt mattresses. In concluding its discussion of these various forms of protection, the committee stated that the situation existing at the location under consideration should govern the design and construction of dikes and mattresses to be used.

Dimensions of Inland Waterway Craft

In introducing its report, which has to do with the ruling heights and widths of inland waterway craft which control the

* Engineer Maintenance and Construction, Baltimore & Ohio Chicago Terminal.

vertical and horizontal clearances of bridges over waterways, the committee stated that the construction of inland waterways in the vicinity of Chicago as a part of the Lakes-to-Gulf Waterway system has presented many problems to the railroads entering Chicago. As a result, it said that the various railroads involved formed a committee to deal with this subject and employed experts in the design of inland waterway craft to present evidence before boards acting under the authority of the War department or of Congress in connection with the matter of the economical vertical clearances of bridges over this waterway system.

The report proper of the committee was largely a summary of the opinions of these experts on the questions involved. However, there were also included in the report extracts from a report on a review of reports on the Calumet-Sag channel, Illinois, and the Indiana Harbor canal, Indiana, dated July 2, 1936, submitted to the Chief of Engineers, U. S. Army, by the special board of the War department. In this latter part of the committee's report are included examples of actual operation on the inland waterways in the vicinity of Chicago. The examples, the committee said, further confirm the conclusion that an overhead clearance of 21 ft. on inland waterways is adequate for the safe and economical operation of cargo barges, towboats and self-propelled barges. The report was submitted as complete, for information, with the recommendation that the subject be discontinued.

The report was received without discussion.

Report on Masonry

J. F. Leonard, Chairman*

Of the 11 assignments upon which this committee has been working during the year, detailed reports were presented on six and progress noted on the remaining five, a verbal report being presented on the tentative specifications recently issued by the Joint Committee on Concrete and Reinforced Concrete, upon which the Association is represented. A number of important additions to and revisions of the matter now in the Manual were recommended, and the A. S. T. M. specification for Concrete Culvert pipe was recommended for inclusion in the Manual, while the remaining reports were for information.

Revision of the Manual

The recommendations of the committee with respect to revision of the Manual were as follows: Addition to the specifications for concrete of a provision for controlling the grading and uniformity of fine aggregates; a provision that coarse aggregates to be used in concrete that is subject to surface abrasion shall meet the requirements of A. S. T. M. standard D2-33 for rock and A. S. T. M. serial designation D289-28T for gravel; methods of sampling aggregates and for testing them for grading, fineness modulus, organic impurities, coal and lignite, fineness, clay lumps, soft fragments, soundness, resistance to abrasion, weight per cubic foot of slag, and amount of combustible and volatile materials contained in the aggregates, in accordance with the various A. S. T. M. requirements for these tests, except fineness modulus and soft fragments, the latter to be in accordance with the requirements of A. A. S. H. O. designation T-8.

The committee also recommended the withdrawal of the present specifications covering reinforcing bars and the substitution of the applicable A. S. T. M. requirements for these materials; and a requirement that concrete materials shall be measured by weight instead of volume, unless other methods are authorized specifically by the engineer.

All of the recommendations were adopted.

Reinforced Brickwork

After reviewing briefly the genesis of reinforced brickwork, the committee set forth the claims of the proponents of this form of construction and then summarized the conclusions of the engineers who conducted the research, as follows: (a) Test results for various makes and types of brick are so divergent that individual tests for the specific brick to be used must be made; (b) many bricks are unsuited for this type of construction; (c) the properties of the mortar are of prime importance; (d) more

* Engineer Bridges and Buildings, Pennsylvania.

data are needed on the effect of time, repeated loadings, mortar shrinkage, temperature changes and reinforcement requirements; (e) new methods are necessary for providing reinforcement to resist stresses in bond, shear, diagonal tension and negative moment; (f) different ways of laying brick produce widely different results; (g) workmanship is the most important single item in such construction; (h) current methods of laying brick do not meet the requirements for reinforced brick construction; (i) data on curing are far from conclusive; and (j) many problems of technical characteristics and practical construction require further research before this construction can be used widely.

The committee appended a partial list of publications dealing with reinforced brick work.

Economics of Light-Weight Aggregates

In its report on this subject the committee first listed the various materials which have been used as light-weight aggregates, and gave trade names for those that are manufactured specifically for this use. After discussing the characteristics of these aggregates, which include low specific gravity, a consequent tendency to segregate, relatively high absorption, the lower compressive strength of concrete made with light-weight aggregates as compared with that of concrete made with the usual natural aggregates, consideration was given to the principles governing the economic use of light-weight aggregates which result from reduction in the dead load.

Present-Day Cements

Under this assignment, the committee reported that while it has been possible to increase the strength-giving qualities of cements at early periods without adding anything new or different to the raw mix or the finished product, some change has been necessary in the proportions of the raw ingredients to attain this objective, and that the mixture is being subjected to much longer burning and the finished product to finer grinding. These cements differ from the earlier cements and require a different technic in their use. Since solution of the problem with respect to the adjustments that should be made to insure best results from these newer cements needs further study, particularly with respect to heat of hydration and constancy of volume, the committee recommended that such an investigation be undertaken by the Engineering Research Advisory Committee of the A. A. R.

Specifications for Foundations

Under this assignment the committee presented for information, with the purpose of presenting later for adoption, a new specification for pile foundations, under the following sections: Scope, purpose and necessity for piles, design, allowable load on piles, loading test, types of piles, driving and spacing.

B. R. Leffler (N. Y. C.) spoke of the importance of earth pressures on foundations and suggested an addition to the proposed specifications in this regard. The committee agreed to give consideration to this suggestion.

Pumping Concrete

The committee submitted as information a revised and enlarged specification for pumping concrete, to replace that presented in 1937. The new specification includes requirements to which the equipment must conform, requirements for its operation, for the transportation of the concrete, for the cleaning of the pipe lines after the completion of a run, and for the mixing and proportioning of the concrete.

Concrete Culvert Pipe

In 1937 the Association endorsed A. S. T. M. specification C76-35T for reinforced concrete culvert pipe. Since these specifications have now been made standard under the designation C76-37, the committee recommended their adoption for inclusion in the Manual. The committee reported that while the use of concrete culvert pipe that is not manufactured and tested in accordance with the foregoing specification should be avoided, it recognized that this is not always possible and laid down certain requirements that should be met under such circumstances.

The specifications were adopted.

Other Subjects

In addition to the foregoing subjects, the committee indicated that it had made progress in the study of the design of concrete

columns, pipe columns, multiple-span rigid-frame bridges, concrete-bridge-deck slabs of the non-ballasted type, and Isteg reinforcing steel. In the science and art of concrete manufacture, it reported progress in study on the effect of traffic vibration on shotcrete during and immediately after placing; on prest-wood, plywood and special fibrous materials for forms and form linings; and on standard portland cement compared with standard high-early-strength portland cement. Progress was also reported on lining and relining tunnels; review of A. A. S. H. O. specifications for overhead highway bridges, so far as they relate to masonry; and the rating of concrete bridges.

Economics of Railway Location

H. M. Stout, Chairman*

The committee presented progress reports on five of its six assignments, offering this year, for later consideration for inclusion in the Manual, a treatise of steam locomotives and Diesel-electric power, and an addendum to last year's report on electric locomotives.

Revision of the Manual

Under this head, the committee submitted a discussion of the capacities and characteristics of steam and oil-electric locomotives, and gas-electric rail cars as a basis for revising the Manual next year. The proposed revisions also include part of last year's discussion of the capacities and characteristics of electric locomotives. When its reports on motive power are brought together, the committee said, a means will be available for comparing all types of motive power on a common basis, and the information then at hand will be most helpful in analyzing some of the merits of different types of construction and design.

In order to conserve space, the committee divided its comments into two parts—a general discussion, which material is intended for inclusion in the Manual at a later date, and three exhibits, intended as reference material. Under that part of its report dealing with steam locomotives, it first discussed the relationship between the characteristics of the locomotive and the characteristics of the roadbed and general operating conditions. Then, turning to the locomotive itself, it discussed the weight of locomotives, their classification, and their tracking qualities. Continuing, it discussed the methods of calculating the capacities of steam locomotives, and included a description of a short-cut method, involving the use of a chart, which it said could be used to find the approximate horsepower capacity of various types of typical steam locomotives based upon the weight of engine and weight of drivers.

Continuing its discussion of steam locomotives, the report then dealt with the weights of tenders, typical characteristics of steam locomotives, and performance and fuel consumption. Exhibit A following this part of the report, presents a study of some of the fundamental principles which govern steam locomotive capacities in order that these locomotives can be compared with other forms of motive power, and also for use as reference in connection with the foregoing discussion in the report.

Exhibit B submitted with the report is largely a treatise on electric braking, which was presented as a supplement to the report of the committee last year on the capacities and characteristics of electric locomotives. However, this exhibit also gives detailed consideration to the design and characteristics of oil-electric locomotives and rail cars.

Exhibit C appending the report calls attention to some of the similarities and some of the differences between steam and oil-electric locomotives, primarily for reference in connection with Exhibit A.

Grade Revision as Affected by Electric Operation

The committee continued its study of electric operation with the aim of determining the possibilities of this type of operation as an alternative for grade revision or heavier steam power in looking toward greater economy in train operation. As its report, it summarized the findings of its reports submitted in 1920, 1921, 1924, 1926 and 1931, and also material on this subject adopted and included in the Manual in 1930. Following this general summary, which pointed out the advantages and disadvantages of electric operation, the committee presented an ana-

* Assistant Valuation Engineer, Northern Pacific.

lytical determination of the capacities of electric locomotives to meet special operating conditions, and then worked out an example, using forms and tables which it had submitted in the past, for determining the electric energy requirements for electric freight train operation over heavier grades. In this example it took the specific case of an electrified section of the Great Northern through the Cascade range, extending from Wenatchee to Skykomish, Wash., a distance of approximately 73.2 miles.

Speeds in Excess of 75 Miles an Hour

Continuing its study of this subject, begun in 1935, the committee directed attention to some features which it said should be investigated in particular cases where high-speed operation is contemplated; recorded some results from actual experience with high-speed operation; and reviewed some of the underlying principles used as a basis for the establishment of high-speed schedules.

At the outset of its report it discussed the development of high-speed rail traffic in the United States and then presented data with regard to record train speeds in the United States and in Europe. Later in its report, it dealt with high-speed schedules as opposed to record top speeds; factors limiting the speed of trains; the effects of alignment on speed; the characteristics of track necessary to sustain high-speed operation; and lastly, the effects of high-speed train operation on roadway and track. In that part of its report dealing with factors limiting the speed of trains, the committee discussed at length the experiences of the Chicago, Burlington & Quincy in the establishment of its high-speed runs between Chicago and Denver, Colo.

As a supplement to its report, the committee presented as Exhibit A, a bibliography of published material on high-speed trains and related subjects, this including 30 articles which have appeared in the *Railway Age* since November, 1934.

Spirals Required for High-Speed Operation

The data submitted on this subject were essentially the result of a questionnaire sent to those roads which are operating high-speed passenger trains, and dealt largely with spiral data for high-speed curves. Concerning these data, which were presented in tabular form, the committee commented as follows:

"Of the 18 roads reporting, 7 are using the A. R. E. A. recommended rate of transition of $1\frac{1}{4}$ in. per sec.; 4 roads are using a lesser rate, and 7 roads are using a greater rate. Since 11 of the roads are using the rate of transition of $1\frac{1}{4}$ in. per sec. or less, there seems to be no reason at this time to change the association's maximum rate of $1\frac{1}{4}$ in. per sec."

In a second table, the committee showed the length of spirals and run-offs required for running off elevation of curves at the rate of $1\frac{1}{4}$ in. per sec. of rise, and in a third table it presented transition curve data from a number of European roads taken from bulletins of the International Railway Congress Association, presented at the session held in Paris in 1937.

Grades and Alignment Through Tunnels

In recognition of the problems of operating heavy trains in long tunnels, primarily because of invariably poorer track conditions and the effect of heat and smoke where locomotives are working hard, the committee gave consideration to the advantages of light grades in tunnels, and in its report discussed the various factors having bearing on this subject and worked out a problem showing the relative reduction in grades required in tunnels where these factors exist to compensate for the reduced tractive force of locomotives in tunnels. Summarizing its findings, the committee offered the following conclusions:

It is the opinion of the committee that, taking into consideration proper drainage, the rate of grade in tunnels should be kept as low as is practical, and that in the case of tunnels more than 500 ft. in length, the rate of grade through the tunnels should not exceed 75 per cent of that of the ruling grade, and that this reduced grade should be extended for the full length of a maximum train beyond each end of the tunnel, but not less than 3,000 ft. from the lower end of the tunnel, and for one-half this distance, but not less than 1,500 ft., from the higher end of the tunnel. If the tunnel is on a curve, the regular compensation for curvature should be introduced.

Other Subjects

Without making report, the committee indicated that it had made progress in the study of its assignment calling upon it to

compile operating data essential to establishing units for making line and grade revisions to meet operating requirements.

The report was accepted without discussion.

Waterproofing of Railway Structures

J. A. Lahmer, Chairman*

This committee has been actively engaged during the year in completing the specifications for bituminous emulsions for dampproofing which have been under study for three years and which were presented as information in 1936. The specifications, which were presented for inclusion in the Manual, cover both asphalt (clay type) and coal tar (soap type) emulsions, and include general requirements for bituminous emulsions, inspection and tests, preparation of surfaces to be dampproofed, methods of application, amount of emulsion to be used and prohibitions against application during low temperatures.

No revisions of the Manual were proposed.

Following a discussion with respect to making all of the requirements for emulsion, both asphalt and coal tar, exactly the same, entered into primarily by Meyer Hirschthal (D. L. & W.) and Chairman Lahmer, the suggestions were adopted as presented.

Economics of Railway Operation

M. F. Mannion, Chairman†

Of the six assignments reported upon by the committee, four were covered by completion reports, submitted as information, while the remaining two were covered by progress reports, with the recommendation that the subjects be continued. No revisions were recommended in Manual material.

More Intensive Use of Existing Railway Facilities

Under this assignment, the committee gave its attention entirely to the co-ordination of facilities where two or more lines found it possible to co-ordinate and consolidate their properties without detriment to the public interest, and, at the same time, effect economies by sharing operating expenses. Its work in this regard supplements earlier work on this subject, and reports submitted in 1935 and 1937.

This year, the committee secured information relative to a number of pooling arrangements which have been approved by the Interstate Commerce Commission, and which were in effect as of September 18, 1937, and based its report thereon, giving a brief description of these arrangements, together with I. C. C. docket references. The specific examples of co-ordination and consolidation had to do with the following subjects:

Traffic originating at and destined to points on the Gulf & Northern Railroad; joint passenger train service between the Twin Cities and the head of the Great Lakes; pooling of iron ore and coal traffic between points in Minnesota and Wisconsin; pooling iron ore traffic between points in Michigan and Wisconsin; pooled passenger train service between Montreal, Que., Portland, Me., and Kennebunk, Me.; pooling of iron ore traffic between points in Wisconsin and Michigan (Menominee range); joint passenger train service between Seattle and Portland, Wash., and the pooling of revenues and expenses in connection therewith; pooling of passenger train service between the head of the Great Lakes and Chicago and Milwaukee, Wis.; and pooling of passenger train revenues between Montreal, Que., and Toronto, Ont., between Ottawa, Ont., and Toronto, and between Montreal and Quebec, Que.

Problems Relating to More Efficient Operation

During the last year the committee gave further attention to methods of determining the value of rise and fall and distance and curvature in minor line and grade revisions on operating railways. At the outset of its report on this subject, it stated that it is an accepted fact that all of these factors affect operating expenses, but it pointed out that a precise determination of the effect of each is precluded by economical and practical limits of physical and accounting records, and by the influences

* Senior Assistant Engineer, Missouri Pacific.

† Office Asst. to Chief Engineer, Bessemer & Lake Erie.

of varying local conditions. However, it felt that in many cases a practical solution is possible by the use of available accounting records and the judgment of experienced maintenance and operating men, and worked out a specific problem in this regard using as a basis of computation the records of a certain Class I road.

In its study of this subject, and in arriving at its suggested procedure, the committee referred freely to Wellington's work on "Railway Location," Sixth edition.

When Should a Railway or Branch Be Retired?

Following a study of the reports of several railroads in connection with the abandonment or proposed retirement of certain of their branch lines, the committee found that each road used a different yardstick to measure the effect of the revenue and expenses of the branch line in question on the revenue and expenses of the system as a whole. Therefore, in its report, which was brief, it expressed the belief that no hard and fast rule can be used to determine when a line should be retired. It stated also that, in its opinion, local conditions, possible future business expansion, the development of natural resources, etc., in the last analysis, make each line an individual problem.

While the committee found that different yardsticks were being used by different roads, it also found that the methods used by the various roads in developing their studies were similar to those suggested in a previous report of the committee, published in Volume 28 of the Proceedings, pages 535 to 556. In view of this, it recommended that reference be made in the Manual to this material in the Proceedings, and that the subject be discontinued.

Most Economical Train Length

At the outset in its report, the committee pointed out that conditions vary so widely in practice that it is impractical to devise a general method for determining the most economical train length which can be applied to all cases. However, it outlined the essential steps that must be taken in determining the most economical operation of freight trains, and then worked out the case of a specific section of road in order to illustrate the method involved. Commenting upon the method employed, the committee said that the most important result to be obtained through its use is to obtain a picture of the problem as it exists, which will serve as a guide for selecting new methods or facilities to meet changing conditions.

In Exhibit A supplementing its report, the committee worked out another problem on the same road as considered in its report proper, in this case on the assumption that accurate tonnage rates and performance data on the locomotives involved could not be determined from the tables and charts used in connection with the solution of the first problem.

Train Resistance as Affected by Weight of Rail

The committee gave further consideration during the year to the material which it submitted on this subject at last year's convention, particularly in view of certain suggestions made by Dr. A. N. Talbot, University of Illinois, that further study should be given to the effect of wheel spacing and the stiffness of the track structure. However, in the brief report submitted, it said that it feels that since the methods developed in the earlier report may be used for any combination of wheel arrangement, wheel loading, or degree of stiffness of the sub-structure, it is not necessary to modify the report as was presented originally.

Movement of Freight by Rail, Highway, or Both

After three years of consideration of this subject of the economic limit of the movement by the railway of freight from shipper to receiver, by rail, by highway, or by a combination of both, the committee offered the following brief comments on its findings:

"Our study has shown that very little information is available on this subject, and that what is available is of questionable value. Furthermore, operating costs in the trucking industry are in such a state of flux that it is doubtful whether unit cost figures having any permanence will be available for two or three years. Similarly, in the railway field, wage increases and other changes in factors affecting freight handling costs have changed or are changing the cost of handling freight in terminal areas.

Recent developments in oil-powered locomotives promise further changes in operating costs."

In view of these conditions, the committee recommended that this subject be discontinued until such time as rail and motor transport costs become more stable.

Other Subjects

No reports were presented this year on the assignments of the committee having to do with revision of the Manual and the effect of the volume of traffic on railway operating expenses.

This report was accepted without discussion.

Wood Preservation

C. F. Ford, Chairman*

The report of the committee this year covered only those of its assignments having to do with service test records for treated ties; piling used for marine construction; and the destruction by termites and best ways of preventing termite damage. However, the committee reported progress in the study of its five other assignments.

Service Test Records of Treated Ties

Continuing its practice of past years, the committee included in its report the usual table of tie renewals per mile maintained on various roads, revised to include the renewals made during 1936. It also presented a series of reports of special tie tests made over a period of years on the Chicago, Burlington & Quincy; the Chicago, Milwaukee, St. Paul & Pacific; the Great Northern; the Northern Pacific; and the Public Service Company of Indiana.

Piling Used for Marine Construction

In accordance with its usual practice, the committee reported on various long-time timber tests under observation by itself, the Chemical Warfare Service, and other collaborators, including the governor of the Panama Canal zone. It also reported again briefly this year upon the status of the marine borer attack along the New England coast, which is being studied by the New England Committee on Marine Piling Investigation.

Summarizing the material brought to its attention, the committee said as follows:

"The tests of tropical timbers which have been carried on in the Panama Canal zone have shown their value by the discovery of several timbers which have high resistance to marine borer attack. Because this attack is much more destructive in tropical waters than in temperate waters, it is probable that the timbers which show high resistance in the canal zone, would give very long service in more northerly waters.

"The results of the New England investigation show that no harbor in salt water can safely be considered permanently immune from attack. The result of attack in a large harbor, which has been considered immune in the past, is seen at Boston. Papers presented at the recent meeting of the American Society of Civil Engineers described the repairs to two docks at Boston which had been necessitated by borer attack. The cost of repairs to these structures alone was approximately \$1,800,000."

Termites

The report of the committee was essentially a report of the final inspection of the termite soil poison test which the committee has been conducting at Florissant, Mo. Therein it included a description of the test, a list of the various compounds or solutions used, and a tabulation of the results secured in the way of the relative effectiveness of the different compounds or solutions.

Summarizing its findings, the committee said, in part, as follows:

"The final conclusion drawn from the test is that none of the substances experimented with, except trichlorobenzene, fully protected the faces of wood after exposure of five years. No compound can be regarded as an effective soil poison, which, after as short a time as five years, showed signs of failure to protect the wood against these insects. Trichlorobenzene appeared to be an exception, but how much longer this compound would have

* Supervisor Tie and Timber Department, Chicago, Rock Island & Pacific.

protected the wood is a matter for conjecture. Further experiments, therefore, should be made.

"It should be emphasized again that the test at Florissant dealt exclusively with soil poison applied to the ground around untreated pine posts, and has no bearing whatsoever upon the resistance to attack by termites of timber impregnated by the pressure process employing the various compounds used."

Supplementing its report, the committee presented a series of photographs showing the appearance of the various posts in the test after their removal from the ground.

This report was received without discussion.

Rules and Organization

E. H. Barnhart, Chairman*

The report of the committee was confined to revisions of existing rules in the Manual, with a few deletions and additions, and to the presentation of an entirely new set of rules governing the welding of frogs, switches and rail ends in track. Progress was reported in the preparation of additional rules for fire protection.

Revision of the Manual

Most of the existing rules in the Manual affected by the recommendations of the committee have to do with rail renewals and ballast, approximately 25 rules being involved in some way, from minor revision to outright deletion. In addition, however, the committee presented a new, several-part, comprehensive rule with regard to the points to be examined in connection with the inspection of bridges, trestles and culverts (No. 1390); recommended eliminating eight rules dealing with the maintenance of masonry bridges; and submitted a revision of rule No. 1926 with regard to the design of bulk gasoline and oil stations, and gasoline loading and unloading racks.

These recommendations were approved.

Welding of Frogs, Switches and Crossings

As the result of collaboration with the Committees on Track and on Economics of Railway Labor, the committee presented, as information, a group of eight rules dealing with the building up of rail ends by welding; a group of nine rules with regard to the welding of frogs; and a group of five rules having to do with the repair of switch points by welding. These groups were accompanied by six additional rules of a general character, applicable to all of the various classes of rail and special track-work welding. The rules submitted with regard to rail end welding, most of which have to do with the general conditioning of the joints before welding is started, are as follows:

(1) All rail ends having batter less than in. should be welded.

(2) Rail with ends battered in excess of in. or distorted by line or surface kinks, or rail with a generally corrugated surface, should not be welded.

(3) Joint must be thoroughly tamped and brought to proper surface and cross level before any welding is done. Bars must fit snugly throughout, particularly at the center of the top, with sufficient drawing space between the inside of the bar and the web of the rail. If the inside of the bar is in contact with the web of the rail, or is too close to allow proper drawing space, or does not have a close fit at the center of the top of the bar, the condition must be corrected by changing the bars, using shims, or other methods. Bolts must be tightened, and, if necessary, must be renewed.

(4) The joint ties, when necessary to provide proper joint support, must be renewed.

(5) The ballast at joints must be cleaned to provide proper drainage.

(6) At all chipped or spalled rail ends, the surface metal must be removed to clean parent metal, welded and ground to a true surface. Where rail ends are cupped and the surface is upset, the cupped surface should be built up and the upset portion ground down to a true surface.

(7) Proper expansion space between rails at joints must be provided and maintained to avoid the chipping of the rail ends.

(8) (a) After the welding of an insulated joint, proper insu-

lation must be applied before starting the welding of another insulated joint.

(b) Sharp or rough points on the rail ends must be removed after making the cut to prevent the cutting out of the insulation end posts.

This report was received without further comment.

Economics of Railway Labor

F. S. Schwinn, Chairman*

The committee, which has been actively engaged in the study of all of its 10 assignments, reported in detail on 8 subjects, of which 3 were progress reports, 4 were complete and presented as information and 1 contained matter for inclusion in the manual. Progress was reported on studies for revision of the Manual and on economics of methods of weed killing.

Roads That Have Reduced Labor Requirements

The St. Louis Southwestern was chosen for the study leading to this year's report, since this gave an opportunity to study the effects of the improvements in both maintenance and the physical characteristics of the line that were made in the period beginning with 1923. The report, which was presented as information, stated that this study emphasizes the effect on labor costs of an extensive program of rehabilitation and betterment on a railroad upon which maintenance has been deferred, and that the improvement program will continue to yield an excellent return on its cost in the form of reduced maintenance expense. The report was accompanied by 11 charts based on the detailed information given concerning the various items under study.

Organization of Forces

The study for this year, which covered the building up of rail ends by electric welding, discussed the preparatory work that should precede the actual welding, the gang organization, the duties of the various men employed and emphasized that quality of workmanship is the most important factor in welding.

The committee also presented a monograph by H. E. Kirby, assistant engineer, Chesapeake & Ohio, containing an exhaustive analysis of mechanized rail laying organizations, in which the various steps in the process of rail replacement were discussed and the continuous and cyclical methods were analyzed. Numerous tables were included to show in detail the various operations and the number of men to be assigned to each under the various conditions assumed.

Out-of-Face Renewal of Track

Last year the committee reviewed foreign practices with respect to out-of-face renewals of track. This year it collected similar information in this country from two roads that had made renewals in this way for comparison with GEO installations made at the same time. The cost of renewing track out-of-face and of subsequent maintenance costs were given in detail. From these studies the committee concluded that under conditions now existing on American railways, no economy will be effected by the out-of-face renewal of ties.

Economies Through Increased Capital Expenditures

Studies under this assignment included economies resulting from driving piles to support a setting embankment, from the purchase of bolt-tightening machines, from the installation of automatic pumping plants, from the installation of 19 flashing-light signals at grade crossings, from the installation of automatic interlockings, from the operation of a cinder hoist, from the application of anti-creepers, from the laying of heavier rail, and from draining wet cuts. The committee reported that while many benefits and savings cannot be expressed accurately in dollars and cents, the benefits may be substantial and result in real economies.

Welding and the Use of Reformed Joint Bars

This report was the result of a diligent study of the subject for four years. After analyzing the information received from 73 maintenance officers on 28 roads, the committee reported that where rail is badly battered and the bars are badly worn, welding the rail and renewing the joint bars will effect a saving

* Assistant Division Engineer, Baltimore & Ohio.

* Assistant Chief Engineer, Missouri Pacific Lines.

of from 50 to 60 per cent during the first year; that where wear and batter are comparatively light, this saving will be from 20 to 25 per cent; and that over a full cycle between the correction of battered joints, the saving will amount to from 35 to 45 per cent.

Recent Developments in Gang Organization

Starting from the premises that power-operated equipment must be used for the maximum practicable number of days each year if it is to produce substantial economies, and that this can be effected best by placing it in the hands of specialized gangs, the committee made a study of the practices on 15 roads in this respect and reported that the specialized gang is an economical unit; that with experience these gangs increase in efficiency; and that they obtain maximum use of power tools and best justify the investment in such tools.

Maintenance Costs on Different Kinds of Ballast

The committee was unable to find any roads that keeps cost records of maintaining track on various kinds of ballast. As a practical approach, a questionnaire was sent out inquiring as to kinds of ballast, the most desirable sizes, reasons for using particular kinds of ballast, labor of reballasting, frequency of reballasting, labor of renewing ties, labor of smoothing and lining track and the labor of keeping down weeds. The replies were tabulated and from them a comparative rating was given to each kind of ballast.

Meeting Tomorrow's Demands for Labor

This assignment included supervisory forces as well as labor and the report called attention to the fact that because the drastic reductions during recent years affected the junior men in the organization, the average age of men in supervisory positions is unusually high. The report discussed two methods of selecting and training men for supervisory positions (a) taking ambitious and capable men from the ranks; and (b) attracting college and university graduates and training them for supervisory positions. The committee reaffirmed the conclusions now appearing in the Manual but recommended three minor revisions in the wording of the conclusions.

These recommendations were adopted.

Iron and Steel Structures

R. A. Van Ness, Chairman*

This committee worked actively during the year on 8 of its 10 assignments and made detailed reports on 4 subjects, reported progress on 4 and made no report on 2. Those upon which detailed reports were made were revision of Manual; specification for fusion welding and gas cutting for steel structures; design of rivet heads for steel structures; and review of A. A. S. H. O. specifications for overhead highway bridges.

Revision of the Manual

Extensive revisions of the Manual were recommended. In general, these revisions were in the nature of editing, which use of the specifications had shown were desirable to clarify the meaning of certain sections or to make the requirements more specific. While a few additions were recommended, these were generally minor in character and were for the purpose of completing or rounding out the requirements of the sections to which they were assigned.

All of the revisions were adopted.

Specifications for Fusion Welding

After considerable study of this subject and a careful review of the specifications of the American Welding Society, the committee recommended that the following reference be included in the Manual:

"Specifications for Design, Construction, Alteration and Repair of Highway and Railway Bridges by Fusion Welding.

"It was recommended by Committee XV—Iron and Steel Structures, and approved by the A. R. E. A., that the specifications adopted under the foregoing title by the American

* Bridge Engineer System, Atchison, Topeka & Santa Fe.

Welding Society in 1936, be used pending further consideration of the subject by that committee."

The recommendation was adopted without discussion.

Design of Rivet Heads for Steel Structures

For several years the association has been represented on the American Standard Association in connection with the preparation of a standard for large rivets. This work was completed in 1936 and approved by the A. S. A. in March, 1937. The committee recommended that such parts of this standard as are appropriate to cover rivets of $\frac{1}{2}$ in. nominal diameter or larger be adopted for inclusion in the Manual.

This recommendation was adopted.

Overhead Highway Bridges

This assignment was a review of the specifications for overhead highway bridges of the American Association of State Highway Officials. The committee reported that it had reviewed the specifications and that it had agreed with the Committee on Bridges and Structures of the A. A. S. H. O. with respect to certain revisions relating to steel construction, but that the assignment cannot be considered complete until the committees on Masonry and on Wooden Bridges and Trestles have made similar reviews and the three committees have conferred concerning the mutual effect that may result from these reviews.

Other Subjects

Progress was reported in the study of different grades of bronze for use in connection with iron and steel structures; of the design of expansion joints involving iron and steel structures; of the design of tension members in connections in which rivets develop tension; and of the design of steel bridge details. No report was made on stresses in wire ropes bent over sheaves or on the effect of the proposed increase in vehicular weights on highway bridges.

Records and Accounts

C. C. Haire, Chairman*

The assignments of this committee have to do with the preparation and keeping of records and accounts relating to engineering and maintenance and with accounting practices that affect railway engineering. The report covered eight subjects, including revision of the Manual, six of which were progress reports and one was for information.

Revision of the Manual

The committee recommended the restoration to the Manual of three bridge inspection report forms which were inadvertently omitted from the 1936 edition.

This recommendation was approved.

Bibliography

The report contained a short bibliography of books and current publications of outstanding interest to the Association.

Office and Drafting Room Practice

Continuing the work it has carried on for several years, in a program to assemble a complete set of standards for nomenclature, symbols and style, the committee presented as information 12 plates, including standard steel filing cabinets (2 plates); style to be used in the preparation of reports and specifications (4 plates); nomenclature for specifications (2 plates); typical specification (1 plate); and typical examples of good style for specifications (3 plates).

In addition, eight plates, including drawing nomenclature (3); materials-abbreviations (1); method of designating taper, batter, cant, slope, incline and grade (1); welding symbols (1) and conventional welding symbols for butt welds (1) and fillet welds (1), were offered for inclusion in the Manual.

These plates were adopted.

Maintenance of Way Accounts and Statistics

After further study the committee was of the opinion that the form, Exhibit 3, shown on page 620 of Volume 37 of the Pro-

* Engineer Capital Expenditures, Illinois Central.

ceedings, when filled out, provides all the information necessary with respect to accumulation of expenditures, and that no additional form is necessary. The committee is conducting an extensive study of forms for unit cost data, while present studies indicate that the existing forms upon which labor classification and hours and compensation are reported are adequate for all needs so that no additional forms are necessary. The committee is conducting an extensive study of forms for unit cost data, while present studies indicate that the existing forms upon which labor classification, and hours and compensation are reported, are adequate for all needs, so that no additional forms are necessary.

Construction Reports and Records

This year the committee prepared a number of records, including land, grading, tunnels and subways, track and a register of buildings. With respect to the latter, the committee reported that a definite, simple system of identifying buildings is an asset in matters pertaining to accounting, insurance, taxes, valuation, etc.

Methods and Forms for Keeping Property Records Up to Date

The committee has continued its co-operation with the Finance, Accounting, Taxation and Valuation department of the A. A. R., the joint study this year being the proper accounting for ballast, the necessity for which arose out of the change in accounting proposed by the Interstate Commerce Commission in its order originally effective January 1, 1936, but now postponed indefinitely. The report, a copy of which was included in the committee's report as Exhibit 1, was distributed by the A. A. R. to its members on October 12, 1937.

As Exhibit 2, the committee reported on the status of valuation as of November 30, 1937, including a resume of recent court decisions on the valuation of utilities.

Changes in I. C. C. Classification of Accounts

On December 27, 1935, the I. C. C. issued an order modifying the then existing classifications in specified particulars, cancelling some and combining others. The report of the committee includes a resume of a large number of rulings dealing with items involving investment in road and equipment, that have arisen out of these changes.

Avoiding Duplication of Effort

Through co-operation with the A. A. R., the committee has completed a list of reports required by the various state and federal departments, which it included in its report. The list comprises 845 reports, of which 9 are made daily; 5, weekly; 275, monthly; 68, quarterly or semi-annually; 388, annually; and 100 on an "as occur" basis.

The report also contained a list of the Class I roads, the number of clerical employees on each, the number of other employees, and the ratio of all other to clerical employees; this being approximately 10 railway clerks for 75 other employees.

Do They Read The Railway Age?

IT is said to have been the practice of an old time country newspaper editor deliberately to publish an incorrect item of news occasionally in order that he might measure the care with which his paper was read by the number of protests he received regarding his misstatement. While disclaiming deliberate intent, the *Railway Age* finds itself in a position to measure the interest of its readers through an error in its report of a hearing conducted by the Interstate Commerce Commission at Portland, Ore., on January 21 (*Railway Age* of January 29, page 243).

This hearing was one of eight conducted by the commission at such widely separated points as Atlanta, Ga., El Paso, Tex., New Orleans, La., Salt Lake City, Utah, Chicago and Washington within a period of 12 days. To cover all of these hearings accurately was no simple task. Yet our attention has been called to only one error to date.

In our report we stated that "Opposition to the increase was also expressed by wheat farmers, who contended that an increase would virtually prohibit competition in the foreign market which is gradually declining; by G. E. Karlen, president of the Karlen-Davis Lumber Company, Tacoma, Wash.; B. L. Baker of the Wenatchee Valley (Wash.) Traffic Association; and F. K. Feuel, secretary-treasurer of the Rogue River Traffic Association." The error referred to in the letters results from including Mr. Karlen among those who testified in opposition to the rate increase, for he testified in favor of the railways' application. The closeness with which the *Railway Age* is read is shown by the fact that 11 readers have called to our attention the fact that Mr. Karlen appeared in favor of rather than in opposition to the increase.

Mr. Karlen wrote that "a number of railroad officers have called my attention to the report in your publication. I testified in behalf of the railroads."

H. H. Holcomb, vice-president of the Chicago, Burlington & Quincy, wrote "This statement is in error, as the Karlen-Davis Lumber Company has been very friendly toward the railroads."

"We realize," wrote B. S. Merritt, western traffic manager of the Great Northern, "that your publication was in error, which does not happen very often, and as your editions are read so carefully by all interested in railway problems, we are taking the liberty of calling this to your attention as we felt quite sure you would want to correct the statements made in the January 29 issue."

J. T. Saunders, vice-president of the Southern Pacific, said, "The statement is not correct and I am calling the matter to your attention as, no doubt, you will wish to correct it."

"I know," said O. G. Hagemann, general agent of the Chicago, Burlington & Quincy, "that Mr. Karlen defended the railroads' stand and urged that the increase be granted."

Carl R. Gray, Jr., executive vice-president of the Chicago, St. Paul, Minneapolis & Omaha, wrote, "I am wondering if it would be entirely consistent to correct the erroneous impression created."

F. N. Hicks, western traffic manager of the Chicago, Milwaukee, St. Paul & Pacific, wrote, "Will you please refer to the article in your January 29 issue and note the last paragraph which states that Mr. Karlen testified in opposition to the increase. This statement is incorrect and should be retracted."

F. W. Robinson, vice-president of the Union Pacific, wrote, "It is unfortunate that this article lists Mr. Karlen in opposition. I hope you will publish a correction in one of your early issues."

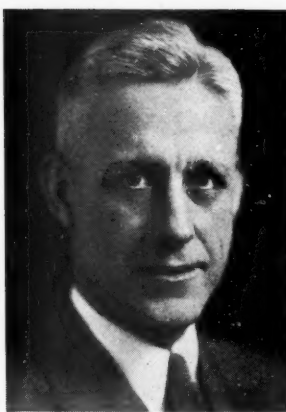
F. R. Newman, vice-president of the Great Northern, wrote, "His testimony was favorable to the railroads and not as reported in the *Railway Age*."

J. L. Burnham, western traffic manager of the Northern Pacific, wrote, "Mr. Karlen was a railroad witness and testified in favor of the increase."

We appreciate the co-operation of our readers in directing our attention to this error. A correction was published in the *Railway Age* of February 12, page 314.



E. D. Cowlin
President



T. E. Rodman
Vice-President



C. H. White
Secretary

N. R. A. A. Presented Exhibit in New Surroundings

IN PRESENTING its exhibit coincident with the A. R. E. A. convention at Chicago on March 14-17 the National Railway Appliances Association inaugurated a new policy by holding the exhibit—in which 93 member companies participated—in the International Amphitheatre where the commodious and attractive surroundings, combined with the high standard of the auxiliary services, elicited much favorable comment on the part of railway officers who attended the convention. To make it possible to attend the exhibit with a maximum of ease and convenience, free buses, provided by the N. R. A. A., operated on frequent schedules between the Palmer House, where the convention was held, and

the Amphitheatre. The space occupied by the displays of the various companies was substantially the same as at last year's exhibit but the improved arrangement of the booths and aisles comprised a distinct step forward in the presentation of the products on exhibition.

The officers of the N. R. A. A., who were responsible for the preparations for the exhibit were: President, E. D. Cowlin, Eaton Manufacturing Company, Reliance Spring Washer division, Massillon, Ohio; vice-president, T. E. Rodman, Maintenance Equipment Company, Chicago; secretary, C. H. White, Industrial Brownhoist Corp., Chicago; treasurer, W. H. Fenley, Kerite In-

(Continued on page 540)

Exhibiting Members

Air Reduction Sales Co., New York; oxygen and acetylene, gas welding and cutting apparatus and supplies, electric arc welding machine and electrodes, literature, demonstration of heat-treating rail ends with 2-flame tip; cropping rail ends with radiograph, specimens of metals coating on bridge parts, demonstration of rail-end hardening with Graham heat-treating machine; C. B. Armstrong, A. W. Brown, J. F. Callahan, J. W. Creely, J. T. Gillespie, Jr., H. A. Hocking, C. W. Holt, J. W. Kennefic, J. W. Knowles, L. T. McDowell, R. T. Peabody, U. F. Portel, H. L. Rogers, E. F. Turner, E. J. Walters, M. Weist, D. J. Williams and I. B. Yates. Space 72.

American Car & Foundry Co., New York; automatic electric steel-bar heater, electric rivet heater, electric metal heaters for heat treating; W. J. Bisset, H. C. Cheston and A. G. Wood. Spaces 163, 164.

American Hoist & Derrick Co., St. Paul, Minn.; photographs and literature on locomotive cranes, crawler-shovel-crane-dragline, rail cranes, derricks, hoisting engines, revolving derricks, wire rope clips, blocks and sheaves; W. E. Bugbee, T. W. Craft, J. L. Hickey, S. M. Hunter, W. B. Maurer, R. W. Payne, S. H. Smith and H. O. Washburn. Space 9.

Association of American Railroads, Washington, D. C.; motion pictures showing progress in rail transportation. Space 104.

Austin-Western Road Machinery Co., Aurora, Ill.; model and moving picture of automatic air-dump car, literature on road machinery and power shovels; H. F. Barrows, J. D. Benbow, H. B. Bushnell, J. E. Huber, H. M. Kleiser, Jess Mossgrove, John W. Patterson and Bruce P. Smith. Space 40.

Barco Manufacturing Co., Chicago; stove, gas hammers, tie tampers, flexible pipe joints; F. N. Bard, William Behlke, W. F. Donaldson, Charles Jenista, L. T. Lytle, C. L. Mellor and F. B. Nugent. Space 84.

Barrett-Christie Co., Chicago; hacksaw blades, chain, ratchet lever and gravity lowering hoists, electric hoists, portable electric tools, power-operated band saw and high-speed cut-off saw; R. P. Kemp. Spaces 133, 135.

Buda Co., Harvey, Ill.; track jacks, tie tampers, rail bender, bumping

post, car stops, track liners, re-railers, bonding drill, track drill, section and inspection motor cars, earth drill, crossing gate, tool grinder, switch stands, tie spacers, gages and levels; H. C. Beebe, R. M. Blackburn, H. S. Brown, E. D. Conant, J. S. Dempsey, R. B. Fisher, J. J. Gard, F. L. Gormley, W. H. Haas, G. W. Hoover, C. T. Miller, F. E. Place, G. A. Secor, L. O. Stratton, E. H. Walker and C. W. Wood. Spaces 27, 30.

Caterpillar Tractor Co., Peoria, Ill.; Diesel power unit and tractor, with power loader, Diesel power unit with LaPlant-Choate road builder and Hyster towing winch; C. M. Burdette, E. R. Galvin, H. M. Hale, R. J. Howard, Geo. Matthes, S. W. McAllister, H. R. Murphy, W. W. Paape, B. C. Patten and C. A. S. Pears. Spaces 77, 78, 79, 80.

H. Channon Company, Chicago; aluminum paint, tap and die, hose and tie banders, rope, goggles, wrenches, ratchet wrenches; Allen Aikens, R. P. Kellen, C. H. McKee, Charles F. Miller and W. Reinike. Space 102.

Chipman Chemical Co., Inc., Bound Brook, N. J.; chemical weed killer; R. N. Chipman, N. S. Leavitt, A. A. Murphy, J. D. Rutan, I. J. Strain and A. J. Williams. Space 21.

Clay Products Association, Chicago; demonstrating the use of vitrified clay sewer pipe for track drainage to eliminate wet spongy roadbed; W. D. Anderson, John W. Hunter and R. G. Scott. Space 157.

Cleveland Frog & Crossing Co., Cleveland, Ohio; frogs, crossings, switch accessories; J. A. Donahey, E. W. Goodaire, L. G. Parker, G. A. Peabody and H. I. Prentice. Spaces 15, 17.

Cleveland Tractor Co., Cleveland, Ohio; tractor with front-end loader and scarifier; L. T. Burwell, T. D. Crowley, L. J. Gallagher, G. F. Hoover, D. A. Milligan, J. W. Montigney, R. W. Payne and J. W. Vogler. Spaces 19, 20.

Crerar, Adams & Co., Chicago; rust preventive, portable hydraulic units, jacks and presses, tie squeezer, handles for track tools, die starter, track and bonding drills, demolition tools, pipe bender, knockout punches, pipe wrenches, fire extinguishers, tool grinders, car cleaner, crayons, tools, air compressors, track shovels, tool handles, hydraulic culvert and pipe pushers; Gill Boers, Wm. Ferguson, Adolph Hawkinson, Tom

- Lewis, E. C. Poehler, Irving Poehler, J. K. Stewart, J. M. Temple and T. F. Tough. Space 73.
- Cullen-Friestedt Co., Chicago; anti-slip rail tong, moving pictures of rail crane, clamshell and lifting magnet; K. J. Beller, W. C. Bamber, L. B. Bertaux, C. J. Bronez, E. V. Cullen, F. J. Cullen, F. P. Cullen, T. G. Frazee, G. H. Goodell, W. C. Irwin, R. W. Jamison and J. F. Leonard. Space 93.
- Dearborn Chemical Co., Chicago; water treating equipment, pumps, chemicals, rust preventives, water testing equipment, chemical proportioning pumps, signal foam-meter, process for corrosion prevention; F. J. Boatright, D. Bodishbaugh, L. D. Brown, G. R. Carr, R. A. Carr, R. F. Carr, Jr., O. W. Carrick, Joseph Crenner, H. B. Crocker, R. A. Dalton, E. A. Goodnow, L. O. Gunderson, W. H. Hinsch, F. B. Horstmann, S. C. Johnson, R. J. Maginn, R. O. Milnes, A. C. Moeller, S. C. Moore, A. Novak, C. C. Rausch and B. H. Stone. Spaces 22, 24, 26.
- DeSanno & Son, A. P., Inc., Philadelphia, Pa.; abrasive wheels and abrasive cutting machine, literature; E. E. Buckingham, R. A. Burton, J. C. Rinehart, E. J. Rohan and W. K. Whelan. Space 149.
- Paul Dickinson, Inc., Chicago; smoke jacks, chimneys for small buildings, roof and deck drains, roof ventilators (full size and models), exhaust heads; P. A. Christensen, A. J. Filkins and William Harrison. Space 155.
- Differential Steel Car Co., Findlay, Ohio; photographs and literature on dump cars; Shelley G. Hughes. Space 105.
- Dimick-Mosher Products Co., Boston, Mass.; Skip-pipe, sloping kradle invert pipe for under-drains; D. B. Dimick and F. W. Mosher. Spaces 110, 111.
- Duff-Norton Manufacturing Co., Pittsburgh, Pa.; track jacks, automatic lowering jacks, ball-bearing self-lowering jacks, standard speed jacks, air-motor-operated power jacks, drift bolt puller, sidelift track jack, journal jack, tie spacer, track lining jack; D. F. Evans, Walter Floyd, J. Gilchrist, George Mayer, A. Roberts, C. N. Thulin and E. E. Thulin. Spaces 37, 39.
- Eaton Manufacturing Co. (Reliance Spring Washer Division), Massillon, Ohio; spring washers, rail bonding washers, locomotive spring washers; E. D. Cowlin, E. C. Gross, R. L. Shireman and A. H. Weston. Space 42.
- Elastic Rail Spike Corp., New York; elastic rail spike; Charles Bernuth, O. M. Bernuth, W. A. Fisher, A. C. Jack and B. Kuckuck. Space 23.
- Electric Tamper & Equipment Co., Ludington, Mich.; electric vibratory tampers, tooth-tip tamper blades, electric generator sets, vibrators for concrete placement, spot tamper outfit, literature; G. E. Cartier, H. W. Cutshall, Corwill Jackson, Raymond Johnson, E. R. Mason, L. S. Osborn, G. F. Swarthout, G. L. Walters, J. Webb and M. S. Westlund. Spaces 115, 125.
- Evans Products Co., Detroit, Mich.; rail-highway truck; Ben Colman, E. S. Evans, C. Goldrick, Charles Gross and L. J. Ruedisueli. Spaces 173, 174.
- Fairbanks, Morse & Co., Chicago; water crane, tank fixtures, motor-driven displacement pump, centrifugal pumps, platform and dial scales, parts for motor cars, magneto, heavy and light section cars, patrol cars, electric motors, engine-driven pump; L. T. Allis, W. F. Anderson, D. L. Arnold, E. P. Chare, R. V. Cook, E. J. Coverdale, J. F. Cruikshank, C. T. Fugitt, E. C. Golladay, W. R. Grant, H. L. Hilleary, E. F. Kulthar, R. F. Lane, D. K. Lee, C. G. Mahana, W. L. Nies, C. B. O'Neil, J. W. Prewitt, C. A. Rauch, H. E. Vogel, and C. H. Wilson. Spaces 1, 2, 3, 4, 5, 6, 7, 8.
- Fairmont Railway Motors, Inc., Fairmont, Minn.; gang cars, standard section cars, inspection cars, light sections cars, bridge and building cars, heavy duty cars, weed mower; Geo. Adams, C. P. Benning, C. W. Brhel, W. D. Brooks, K. K. Cavins, C. J. Damman, W. G. Day, D. E. Doolittle, I. N. Eustis, A. R. Fletcher, C. F. Green, C. H. Johnson, W. F. Kasper, J. T. McMahon, V. Pagett, R. W. Payne, H. W. Protzeller, W. H. Ripken, J. E. Simkins, H. A. Sly, H. M. Starrett, Ira Sublett, H. E. Wade, L. D. Whitaker and W. M. Williamson. Spaces 61, 70.
- General Electric Co., Schenectady, N. Y.; strain gages for impact tests of locomotive axles, track stress, track depression, rail joint studies, electric snow melters, signal transformers, primary and secondary cut-outs, lightning arresters, thyrite discharge resistors, power apparatus for car dumpers and draw bridges; C. C. Bailey, C. Dorticos, W. G. Ferguson, B. S. Pero, F. W. Peters and L. W. Shugg. Spaces 150, 151, 152.
- Hays Track Appliance Co., Richmond, Ind.; bumping post, wheel stops, moving exhibit of derail; Norman E. Caskey, S. W. Hayes, H. J. Mayer, P. C. McClure and R. J. Parshall. Space 153.
- Homelite Corp., Port Chester, N. Y.; portable generators, portable pumps, portable compressor and portable blower; R. J. Edbrooke, A. G. Straetz and Nelson Thomson. Space 166.
- Hubbard & Co., Pittsburgh, Pa.; alloy and carbon-steel testing machine for testing reactive quality of spring washers, track tools, nut locks and spring washers; J. F. W. Kruse, L. J. Wenzel and John Winchantz. Space 56.
- Industrial Brownhoist Corp., Bay City, Mich.; moving pictures of ballast cleaner, car dumper and locomotive crane; Hoyt Hayes, A. P. Lyvers and C. H. White. Space 38.
- Ingot Iron Railway Products Co., Middletown, Ohio; culverts, asbestos-bonded paved pipe, multi-plate pipe and arches, perforated pipe, spiral welded pipe, metal crib wall, tunnel liner, portable air pipe, automatic drainage gates, helical perforated pipe, exhibit of drainage products in action; R. Y. Barham, Edward C. Campbell, E. L. Campbell, C. M. Colvin, E. T. Cross, William Crout, R. B. Faires, W. P. Greenawalt, L. E. Jones, W. J. Kelley, W. P. Lipscomb, M. C. Patton, N. A. Powell, A. W. Spaulding, W. H. Spindler, J. R. Wilkes and J. L. Young. Spaces 185, 186, 187.
- International Harvester Co., Chicago; models of trucks and tractors, photographs and Bucyrus-Erie Bullgrader; R. C. Flodin, W. F. Hebard, Neal Higgins, Don Hipkind, J. W. Kalmes, W. M. Parrish, M. F. Peckels, J. F. Sims and A. W. Turner. Spaces 116, 117.
- Johns-Manville Sales Corp., New York; roofing, Transite pipe, asphalt mineral-surface bridge plank, fire-proof building materials, insulation, friction materials, refractories, asphalt tile flooring, soft mechanical packing, photographs of Transite products; P. R. Austin, W. R. Bush, C. E. Bryant, C. S. Clingman, J. S. Doyle, J. D. Johnson, Thomas O'Leary, Jr., R. J. Offutt, A. C. Pickett, H. R. Poulson, W. W. Prosser, R. P. Townsend, J. H. Trent and F. C. Vandervort. Spaces 59, 60.
- O. F. Jordan Co., East Chicago, Inc.; movies of Jordan spreader, model of Jordan spreader, photos of Jordan spreader; A. W. Banton, O. L. Champion, J. C. Forbes, W. E. Kasten, H. M. McFarlane, W. J. Riley and C. W. Shipley. Space 71.
- Joyce-Cridland Co., Dayton, Ohio; track jacks, bridge jacks, journal jacks, car jacks, locomotive jacks, bus jacks; Huston Brown, E. A. Mann, R. E. Mann, A. A. Walker, W. F. Weber and W. E. Webster. Spaces 14, 16.
- Kalamazoo Railway Supply Co., Kalamazoo, Mich.; heavy and light-duty motor cars, pressed steel and wood center motor car wheels, track gages, track level; H. J. Armstrong, L. Boswell, C. W. Croasdill, R. E. Keller, F. E. McAllister, Robt. McAllister, P. J. Robischung and Z. A. Toye. Spaces 47, 48.
- Lehon Co., Chicago; prepared roofing, asphalt shingles, asbestos shingles and roof coatings; John Eipper, Tom Lehon, E. A. Leonard, R. J. Mulrone, J. W. Shoop, and H. A. Wolfe. Space 25.
- Letterman, Albert L., Chicago; bumping post; Geo. Dolan. Space 161.
- Lewis Bolt & Nut Co., Minneapolis, Minn.; hook bolts, guard rail lag screws, timber bolts, cribbing bolts, guard rail bolts, washer nuts; R. B. Hill and H. W. Johnson. Space 128.
- Locomotive Finished Material Co., Atchison, Kan.; alloy steel self-guarded frog, model of cast iron crossing; R. L. McIntosh, A. H. Moorhead, H. E. Muchnic, G. W. Taylor and John Welch. Space 33, 34.
- Lufkin Rule Co., Saginaw, Mich.; measuring tapes, rules and precision tools, highway drag tape; R. M. Benjamin, E. H. Meibeyer and T. P. Young. Space 189.
- Lundie Engineering Corp., New York; tie plates, safety tie tongs, rail clips; L. B. Armstrong, C. E. Irwin, W. B. Joyce, D. H. Meyer and O. W. Youngquist. Space 49.
- Maintenance Equipment Co., Chicago; rail and flange lubricator, switch-point protector, blue-flag derail, pictures of three-man rail layers, samples of graphite-base lubricants; S. E. Bates, D. M. Clarke, E. Overmier, T. E. Rodman, R. J. Shanahan, G. L. Springborn and P. A. Wells, Jr. Spaces 45, 46.
- Mall Tool Co., Chicago; 5-hp. gasoline rail grinder, cross slotting attachment, nut-setting attachment, gasoline engine with surface grinding and switch point and stock rail grinding attachments, also electric vibrator, saw and drill, chain saw, sump pump, wire brush, electric drills, electric saws and pole gainer; M. H. Haas, J. W. Innes, F. E. Kilbourn, A. W. Mall, F. McGonigle, M. Rehnquist and William Sanders. Space 82.
- Master Builders Company, Cleveland, Ohio; non-shrink cement for grouting and concrete repairs, water-reducing agent for concrete, material for armoring floors, quick-setting materials for tunnel linings, literature on masonry maintenance; J. M. Stone and B. R. Wood. Space 113.
- Mercury Manufacturing Company, Chicago; gas tractor, lift truck; T. W. Barnes, J. R. Bensley, R. F. Liste, P. K. McCullough, L. R. Millar and A. D. Shanks. Space 165.
- Metal & Thermit Corp., New York; Thermit pressure welding equipment for rail joints, pressure and compromise weld joints; Robin B. Bradley, C. M. Lippincott, Anton Lucas, Wm. Sharay, J. B. Tinnon, H. T. Thompson, L. G. Vock and C. D. Young. Spaces 50, 52.
- Morden Frog & Crossing Works, Chicago; manganese insert frog, taper rail, compromise joint, adjustable rail brace, foot guard, switch accessories; E. C. Argust, R. A. Brown, W. Homer Hartz, G. F. Killmer, Lyle Martin, C. E. Murphy and S. S. Withrow. Spaces 91, 92.
- Morrison Railway Supply Corp., Buffalo, N. Y.; Osmose wood preservative, grinding wheels, welding rods, switch point guard, literature on welding service; G. J. Diver, R. L. Morrison, W. F. Pickham and E. Smith. Space 159.
- National Aluminate Co., Chicago; chemical proportioning pump, model of Sparling meter and contact box, cutout of water meter and contact box, new type of sensitive flow switch, working model of the Nalcostill; W. R. Anthony, C. M. Bardwell, R. A. Bardwell, B. D. Barger, C. A. Brown, J. L. Callahan, P. H. Coleman, L. E. Elliott, P. W. Evans, R. E. Falkenburg, C. B. Flint, W. C. Frayer, J. L. Gibboney, L. S. Heason, R. J. Hill, G. A. Johnson, R. V. Lucas, H. A. Marshall, V. E. McCoy, F. C. McKenna, J. W. Moore, E. M. Miller, H. H. Richardson, H. D. Shaw and T. G. Windes. Spaces 11, 13.
- National Carbide Corp., New York; acetylene light and lantern, carbide flare light, motor car headlight; C. B. Armstrong and J. T. Gillespie, Jr. Space 74.
- National Lock Washer Co., Newark, N. J.; spring washers, F. B. Archibald, R. L. Cairns, W. R. Hillary, G. LaRue Masters, George Prest, W. H. Reeves and G. E. Webster. Space 112.
- Nordberg Manufacturing Co., Milwaukee, Wis.; surface grinder, utility grinder and accessories, lag-screw driver, track drill, adzing machine, power jack, spike puller, power track wrench, precision grinder; C. P. Clemmens, W. W. Fitzpatrick, C. K. Jensch, Edward Koenig, H. H. Talboys and H. Wegner. Spaces 143, 148.
- Odenkirk Manufacturing Co., Cleveland, Ohio; safety switch point and signal operating device; H. C. Odenkirk. Space 158.
- Oxweld Railroad Service Co., Chicago; welding equipment, samples of welded rail, switch points and pipe, compromise joints, samples of Stellite in track equipment, flood lights, heat-treated joints; Lem Adams, M. C. Beymer, G. P. Bogert, M. Burnett, Jr., E. Cordeal, F. J. Duffie, E. B. Hall, Jr., F. C. Hasse, W. A. Hogan, W. H. Kofmehl, William Leighton, Wm. Matthes, G. B. Moynahan, D. H. Pittman, J. H. Rodger,

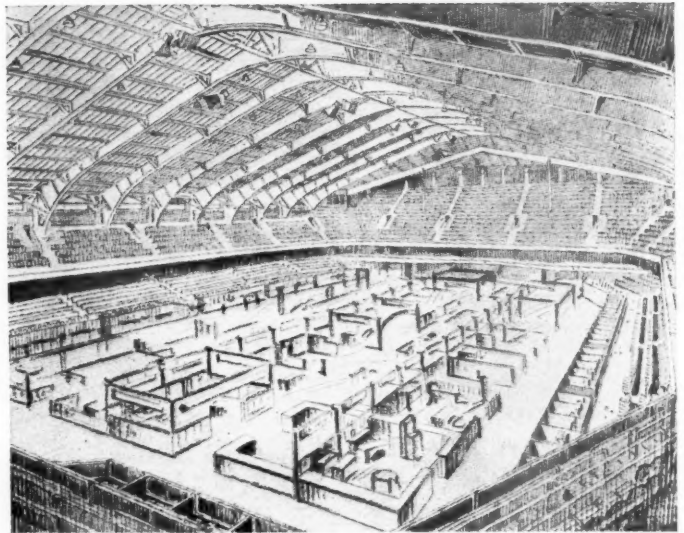
- L. C. Ryan, H. W. Schulze, J. C. Stephenson and F. C. Teichen. Spaces 10, 12.
- P & M Company, Chicago; rail anti-creeper, bond wire protector, tie plates, Willard rail-free tie plate assembly; S. M. Clancey, W. G. Cunningham, John J. Gallagher, D. T. Hallberg, P. H. Hamilton, G. E. Johnson, J. E. Mahoney, W. A. Maxwell, G. E. Olson, R. W. Payne, W. H. Reaves, M. K. Ruppert, L. S. Walker, G. E. Webster and G. T. Willard. Spaces 43, 44.
- Pettibone Mulliken Co., Chicago; high switch stands, switch-point lock, model and full-size crossing, mechanical switch, safety switch stand, manganese guard rail, shoulder bolts, side bearings; J. H. Asselin, C. A. Johnson, C. A. Lanberg, George Lyman, Wm. Olds, John Potts and G. J. Slibeck. Spaces 86, 88, 90.
- Philadelphia Steel & Wire Corp., Philadelphia, Pa.; display of lock washers; Waldo E. Bugbee, R. M. Gow, Jr., John E. Hogan, John M. Newkirk, Stanley H. Smith, Adrian Walker, C. C. Washer and W. F. Weber. Space 114.
- Pocket List of Railroad Officials, New York; copies of publication; Harold A. Brown and B. J. Wilson. Space 132.
- Power Ballaster Company, Chicago; photographs, working model of cribbing machine, motion pictures, power track ballaster; V. Coble, R. E. Madison and F. H. Philbrick. Space 130.
- Q & C Co., New York; switch-point guard, derail, gaging tool, gage rods, rolled steel compromise joints, alloy steel compromise joints, guard rail clamp, safety rail tongs, car stop, rail and flange lubricator; G. H. Godel, L. E. Hassman, E. I. Hetsch, J. L. Terry, Lewis Thomas and C. H. Wilson. Space 58.
- Rail Joint Co., New York; standard and insulated joints, controlled or intermittent bearing joint, armored insulated joint, alloy compromise joints, tight center joint, insulating fibre; V. C. Armstrong, E. W. Backes, Alex Chapman, E. A. Condit, W. E. Gadd, H. C. Hickey, G. H. Larson, J. N. Meade, J. G. Miller, R. W. Payne, Thos. Ryan and R. R. Seward. Spaces 35, 36.
- Railroad Accessories Corp., New York; power track machines for tightening and loosening nuts and setting screw spikes, moving pictures of track machines in use, tie borer and power track drill; S. G. Ellis, B. A. Lundy and F. F. Seeburger. Spaces 122, 123.
- Rails Co., New Haven, Conn.; compression screw spikes, compression spring spike, compression type rail fastenings, cut spikes, oil, electric and gas snow melters, rail, flange and curve lubricator, crossing flange-way bracket; R. E. Bell, L. T. Burwell, J. Flynn, R. W. Helbig, G. M. Hogan, E. R. Packer and J. V. Wescott. Space 126.
- Railway Age—Railway Engineering and Maintenance, New York; copies of publication; G. E. Boyd, M. H. Dick, J. H. Dunn, L. R. Gurley, S. W. Hickey, N. D. Howard, E. T. Howson, P. D. Juraschek, F. C. Koch, W. S. Lacher, Henry Lee, J. G. Little, H. H. Melville, H. A. Morrison and L. B. Sherman. Space 41.
- Railway Maintenance Corporation, Pittsburgh, Pa.; rail joint packer, rail joint corrosion inhibitor, mole derrick, tie and timber bander, photographs of ballast cleaners; W. M. Bell, J. F. Casey, Jr., R. M. Jenner and J. B. McWilliams. Spaces 106, 107, 108, 109.
- Railway Purchases and Stores, Chicago; copies of publication; J. R. Moulton, J. P. Murphy, Jr., K. F. Sheeran and Ed. Wray. Space 137.
- Railway Track-Work Co., Philadelphia, Pa.; portable reciprocating track grinder, portable stock-rail grinder, electric track grinder, rail-joint cross grinder, portable track grinder, samples of abrasives, literature; W. B. Goodall, H. M. Moorhead and A. M. Nardini. Spaces 75, 76.
- Ramapo Ajax Div.—American Brake Shoe & Foundry Co., New York; safety switch stands, rigid switch stands, rail lubricator, reversible manganese insert crossing, photographs and literature on switches and crossings; T. E. Akers, G. A. Carlson, G. M. Cooper, J. E. Davidson, R. E. Einstein, H. Hazelton, A. F. Hess, D. F. Hilton, P. Hoffman, J. V. Houston, A. F. Huber, J. S. Hutchins, J. A. McKivier, E. F. Needham, R. W. Payne, W. A. Peddle and W. Perdue. Spaces 53, 55, 57.
- S. E. Rawls Co., Streator, Ill.; Rawls track mower; L. C. Meskimen, Mertz Rawls and S. E. Rawls. Space 51.
- Reade Manufacturing Co., Inc., Jersey City, N. J.; chemical weed killer, dry and liquid form; D. M. DeWitt, C. A. Parish, R. W. Pritchard, Charles H. Reade, Charles H. Reade, Jr., C. F. Reade and W. L. Tanner. Space 124.
- Republic Steel Corp., Cleveland, Ohio; track bolts, track spikes, tie plates, guard rail, fencing and barbed wire, steel fence posts, culverts, sectional plate, nails and staples, iron sheets, iron pipe, bolts and nuts, turnbuckles, Weltrus highway crossing; C. H. Aiken, R. A. Bell, J. B. Beyer, F. W. Bleiler, A. J. Brandt, E. K. Connelly, T. B. Davies, L. W. Fletcher, J. R. Fraine, N. W. Halls, B. F. Handloser, W. H. Hanna, W. E. Lambert, W. B. Long, A. D. McAdam, H. L. Miller, W. T. O'Neill, A. J. Roof, Frank Schumacher and L. L. Solger. Spaces 85, 87, 89.
- Richter Electric Mower, Beardstown, Ill.; electric mower; O. B. Richter and F. H. Sayre. Space 142.
- Schramm, Inc., West Chester, Pa.; rail car air compressor, section through utility compressor; George B. Comfort, Walter Fischer and Allan Maland. Spaces 139, 140.
- Sika, Inc., New York; concrete water-proofing material; O. R. Haggard, Paul W. Kohler and J. H. Whitney. Space 188.
- Snow Construction Co., T. W., Chicago; water treating equipment, model of locomotive hydrant, model of sand tank and tower, model of coaling station, model of water tank and outlet fixtures, model of Tell-Tails, relief valve; T. S. Daniels, B. S. Snow and W. C. Witt. Spaces 162, 172.
- Sperry Products, Inc., New York; illustrations showing 10 years of development in detector car improvements, samples of rail defects, illustrations and motion pictures of flash butt welding of rails, with actual specimens of flash welds tested, gyro track recorder for track inspection; J. R. Blizzard, E. A. Crawford, H. C. Drake, J. B. Farwell, C. W. Gennett, Jr., and C. W. Lewis. Space 136.
- Strand & Co., N. A., Chicago; flexible shaft equipment; C. W. Blakeslee, L. F. Carlton, Ed. Demski, W. J. Shramek, L. D. Stacy and O. V. Strand. Space 101.
- Syntron Company, Homer City, Pa.; heavy-blow electric tie tampers, and new high-speed electric tie tamper for cinder ballast; D. G. Black, J. F. Chandler and J. A. Roche. Space 138.
- Teleweld, Inc., Chicago; joint shims, samples of welded joints, heat-treated joints, Brinell-hardness tester, moving picture of So. Am. Teleweld activities; R. E. Bell, T. L. Borman, G. A. Greene, John E. Hogan, C. W. McKee, H. E. McKee, J. A. Roche and Stanley H. Smith. Space 127.
- Templeton, Kenly & Co., Ltd., Chicago; rail pullers and expanders, tie spacer, track jacks, push and pull jacks, bridge jacks, ball bearing screw jacks, journal jacks; E. D. Carthey, William Cornu, H. C. Dilisizian, R. B. Hill, P. H. McManus, William Simpson and J. B. Templeton. Space 54.
- Thompson & Co., Pittsburgh, Pa.; process for protecting metal; J. L. deVou, Jr., Otis E. Hovey and D. D. Munroe. Space 154.
- Timber Engineering Co., Washington, D. C.; timber connectors and installation tools, split rings, toothed rings, toothed or flanged shear plates, spiked grids and clamping plates for bridge and building construction; Ira D. S. Kelly. Space 141.
- Track Equipment Corp., Chicago; tie puller—motion picture of tie puller; A. V. Crawford, E. C. Neal, Phil Rozelle and C. L. J. Welch. Space 184.
- U. S. Gypsum Co., Chicago; gypsum plaster and plaster products, steel products, asbestos and magnesia products, gypsum wall board, insulation board, mineral wool and blankets, asphalt roofing products, built-up roofing, chemical hydrated lime, expanded metal products, pipe covering, paint products, lathing materials, acoustical products and treatment, metal roof decks, gypsum roof decks poured and precast, gypsum partition tile, asbestos shingles, asbestos siding, Chrombord, Chromite, Chromwood, panel wood; Theo. Cook, Walter DeHaven, J. O. O'Hara, D. W. Johnson, C. W. Marshall, C. F. Pagott, G. H. Shields, E. C. Steinler, J. L. Voncks and O. C. White. Spaces 120, 121.
- U. S. Wind Engine & Pump Co., Batavia, Ill.; water-column, valves, riser pipe frost-proofing, switch stands, semaphore switch stands, float valves, models of water tanks and towers; H. Beem, R. C. Carlson, J. P. Prindle, LeB. Turner and C. E. Ward. Space 18.
- Western Railroad Supply Co., Chicago; flashlight crossing signals, revolving-banner signals, gate lamps, reflector signs, electric meters, signal accessories, dragging-equipment detectors, model automatic crossing gates; T. H. Cole, F. M. Dolan, L. V. Dolan, Frank Faeth, Godfrey Gort, Norman Gort, John Hensel, S. Miskelly, Stanley H. Smith and A. R. Whitehorn. Spaces 31, 32.
- Westinghouse Elec. & Mfg. Co., East Pittsburgh, Pa.; track switch heater, Millite lighting unit, Rectox rectifier, safety switch demonstration, instrument display, surge-proof transformer, water cooler; C. A. Bercaw, W. G. Brooks, A. H. Candee, P. H. Grunnagle, S. F. Johnson, R. H. Kilner, T. W. Merrill, C. W. Morgan, C. L. Neill, W. F. Smith, L. A. Spangler, T. C. Wurts and G. I. Wright. Spaces 81, 83.
- Wilson Welder & Metals Co., Inc., North Bergen, N. J.; Demo-stationary Wilson gas-drive electric welder, electrodes and accessories; E. Walters and Ira B. Yates. Space 74.
- Woolery Machine Co., Minneapolis, Minn.; light-weight motor car, display of weed burner photographs, power tie cutting machine, drawing of a switch-thawing machine; A. J. Franke, H. E. Woolery and W. F. Woolery. Space 129.
- Yale & Towne Mfg. Co., Philadelphia, Pa.; chain hoists, I-beam trolleys, pull-lifts, hand lift truck, crane trucks, photographs of crane trucks, motion picture of material handling; R. J. Archart, R. L. Biang, G. C. Hayes, G. C. Isbester, Neal Leary, S. A. March, C. H. Moeller and M. G. Peck. Space 131.

Associate Members

- Adams & Westlake Company, Chicago.
- American Chain & Cable Company, Bridgeport, Conn.
- American Fork & Hoe Company, Cleveland, Ohio.
- American Nut & Bolt Fastener Company, Pittsburgh, Pa.
- Armstrong Paint & Varnish Works, Chicago.
- Barrett Company, New York.
- Bethlehem Steel Company, Bethlehem, Pa.
- Blatchford Corporation, Chicago.
- Chicago Pneumatic Tool Company, New York.
- Detroit Graphite Company, Detroit, Mich.
- Frog Switch & Mfg. Co., Carlisle, Pa.
- General Railway Signal Company, Rochester, N. Y.
- Ingersoll-Rand Company, New York.
- Inland Steel Company, Chicago.
- Jones & Laughlin Steel Corporation, Pittsburgh, Pa.
- Kerite Insulated Wire & Cable Co., The, Chicago.
- Magnetic Signal Company, Los Angeles, Cal.
- Massey Concrete Products Corporation, Chicago.
- National Carbon Company, New York.
- National Lead Company, New York.
- Northwestern Motor Company, Eau Claire, Wis.
- Okonite Company, Passaic, N. J.
- Pittsburgh Plate Glass Company, Pittsburgh, Pa.
- Positive Lock Washer Co., Newark, N. J.
- Positive Rail Anchor Company, Chicago.
- Pyle-National Co., Chicago.
- Taylor-Wharton Iron & Steel Company, Chicago.
- Union Switch & Signal Company, Swissvale, Pa.
- United States Steel Corporation, New York.
- Warren Tool Corporation, Warren, Ohio.
- Weir, Kilby Corporation, Cincinnati, Ohio.
- Woodings-Verona Tool Works, Verona, Pa.
- Youngstown Sheet & Tube Company, Youngstown, Ohio.

New and Improved Products

On this and following pages are presented brief descriptions of materials, equipment and devices that have been introduced or improved during the past year



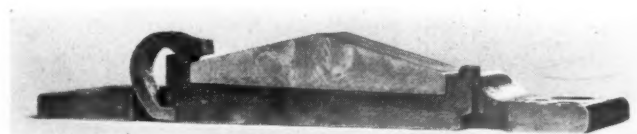
View of a Portion of the Exhibit Area in the International Amphitheatre

A New Rail-Free Tie Plate Assembly

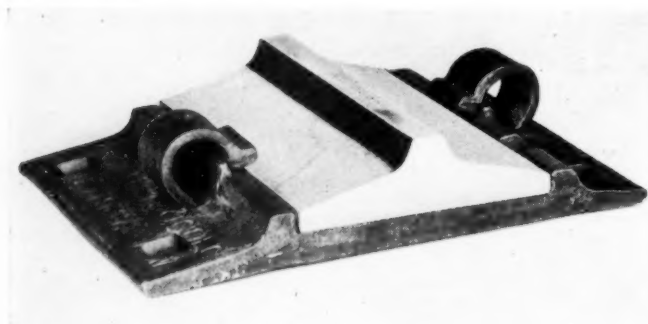
THE P. & M. Company, Chicago, has developed a combination tie plate and rail fastening, known as the Willard Rail Free Assembly, which is designed to fulfill the commonly accepted requisites for an effective rail support at moderate cost. The assembly embraces a means of holding the rail to the tie plate by a fastening that is independent of the lag screws or spikes that hold the tie plate to the tie, the object being to prevent wear of the tie due to movement of the tie plate relative to the tie and obviate removal of the tie plate and re-driving of spikes when renewing rail.

The design embraces a standard heavy double-shoulder tie plate, having a special slot punching just outside the

these slots and lips afford a means for holding two spring clips that serve as the rail fastening. As shown in the illustration, the rail-retaining lugs on the clips clear the top of the rail base by a sufficient amount to allow for normal movement of the rail with wave action, while the plate remains rigidly in contact with the tie due to the pressure brought to bear by the tie plate fastening.



Section of Plate Showing Clip Slot Punching. Note that Clip-Lug Clears Top of Rail Base



View of Assembly of Punched Plate and Rail-Free Clips

two shoulders and a special lip on the shoulders opposite the slots. As seen in the view of the cutaway section,

The lip on the shoulder and the offset in the slot are designed to hold the tempered steel clip securely in place. The clip is quickly sprung into position with a spike maul, and is readily removed for renewing rails by means of a small tool provided for that purpose.

Improves Rolling Grille

THE Kinnear Manufacturing Company, Columbus, Ohio, has incorporated a number of improvements in its metal rolling grille, which are designed to improve its appearance and durability. This grille, which was described in the *Railway Age* of January 18, 1936, is designed for use in door and window openings of warehouses and freight stations and is opened and closed in the same manner as Kinnear rolling doors. It is com-



The Improved Rolling Grille

posed of round steel bars connected by ornamental pressed steel links and is locked in and travels in guides mounted on the sides of the opening. In the raised position the grille coils on a heavy barrel mounted above the lintel.

Among the improvements that have been incorporated in the grille is one which involves the use of a new cast clip connection for fastening the bottom rail to the grille, which replaces the former hand-welded lugs. It is pointed out that, as a result of this change, the appearance of the grille has been improved. In addition the counterbalancing of the grille has been improved as a result of refinements in the springs, which were made following experiments conducted during the fabrication of orders. Finally, whereas the lock on the grille formerly required two castings to be moved, it now requires only one casting.

Reactive Value of Spring Washer Increased

SINCE the Eaton Manufacturing Company, Reliance Spring Division, Massillon, Ohio, introduced its Hy-Pressure Hy-Crome spring washer about a year ago, it has improved the device by increasing the reactive spring pressure to a marked degree without any increase or other change in section. As an example, the



Reliance Hy-Pressure Hy-Crome Spring Washer

reactive value for the washer for 1-in. bolts has been raised from 3,500 to 5,000 lb., thus giving a wide margin over the 2,800 lb. that is required for this washer by the A. R. E. A. specifications. Another feature of the improved Hy-Pressure Hy-Crome spring washer is that it

does not flatten until the applied load reaches a much higher figure, this being 12,000 lb. for the size to be applied to 1-in. bolts.

This company has also brought out a new design of double-spring washer which it designates as the Reliance Double Hy-Crome spring washer. This design has a reactive spring tension far in excess of the A. R. E. A. requirements, this value being approximately 6,000 lb. for the size used on a 1-in. bolt. A feature of the design is a four-point support which prevents the tilting of the washer as the bolt is tightened, thus insuring an even spring tension against the base of the nut and the face of the joint bar.

New Cabinet Model Dry Chemical Feeder

THE Syntron Company, Homer City, Pa., has brought out a new cabinet-enclosed type dry chemical feeder for water-treating plants. The entire machine, including space for the solution pot and a chemical supply hopper having a capacity of three cubic

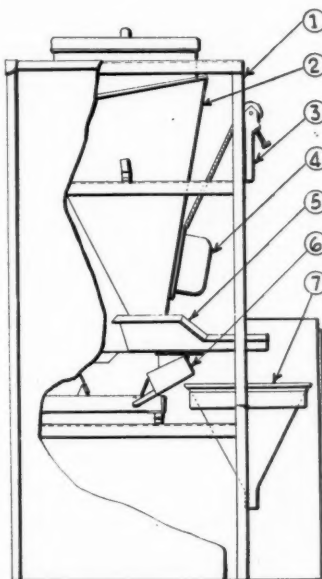


Diagram of Dry Feeder. 1. Frame. 2. Supply Hopper. 3. Hopper Adjustment. 4. Hopper Vibrator. 5. "Vibra-Flow" Feeder. 6. "Vibra-Flow" Magnet. 7. Solution Pot

feet, is enclosed in a dust-tight, sheet-metal housing. This feeder, which proportions by volume rather than by weight, makes use of a vibratory conveyor to provide a flow of dry chemical proportioned to the metered flow of raw water.

This "Vibra-Flow" feeder comprises a trough mounted on leaf springs and is reciprocated by a small electro-magnet. The rate of flow is controlled by varying the current to the trough's electro-magnet through a rheostat connected to a calibrated, indicating meter mounted on a control panel at one side of the machine. The chemical is stored in the built-in hopper which is equipped with a small noiseless electro-magnetic vibrator which keeps the contents agitated to prevent their bridging over and plugging up. An overhead chute can be sealed to the top of the cabinet for refilling the hopper from the floor above. The unit operates on ordinary 110-volt a. c. current, and is said to consume very little power.

Feed capacities range from 5 lb. to 2 tons per hour

for lump lime; from 5 lb. to 800 lb. per hour for alum and soda ash; and from 2 lb. to 250 lb. per hour for hydrated lime.

A removable front panel permits inspection of the feeder-trough's discharge and of the solution pot. The electric control panel is also accessible through a hinged door with a lock.

New Crib Units For Retaining Walls

A COMPLETELY new design of the elements for cellular metal retaining walls has been developed by the Armco Culvert Manufacturers Association, Middletown, Ohio, which will be marketed by the Ingot Iron Railway Products Company. Instead of overlapping stretchers and headers at the corners of bin-type walls, the new design embodies the innovation of a column member to which the other units are joined at the corners of the cells. This new design presents a closed face in all cases, without the necessity of adding filler-pieces between the stringers in the exposed face.

The columns, made of 8-gage ingot iron, have a U-shaped cross section, and are placed with the base of the "U" facing outward. The stringers and the spacers have an S-shaped section and have bolt holes along top and bottom edges for lap splices. The ends of the spacers enter the open side of the U-shaped column and are secured to it by bolted connections; the stringers, which abut against the sides of the column, are attached to it by means of 8-page channel-shaped connectors that are bolted to both the stringer and the column. The columns rest on a bearing plate of 7-gage material that is 18 in. wide and has a length of 18 to 30 in., depending on the height of the wall. The top of the column is closed with a 12-gage channel-shaped cap.

Stringers are 9 ft. 5¼ in. long and are of 10, 12, 14, or 16-gage metal, depending on the height of the wall. The spacers are furnished in three gages and in lengths



Assembly of Armco S-shaped Crib Retaining Wall Units

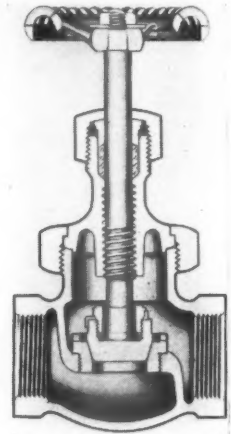
ranging from 5 ft. 2¾ in. in 16-gage iron for walls up to 10 ft. in height, to 14 ft. in 12-gage iron for walls 25 to 30 ft. high. A stringer-stiffener, of 8-gage metal, adds strength to the upper edge of the topmost stringers in the exposed face.

The units nest together conveniently for shipment.

Unskilled workmen, using only hand wrenches, can join them together quickly, and with a minimum of excavation can erect a bin-type retaining wall in short time.

New Crane Globe and Angle Valves

FOR service on small lines carrying steam, hot water, cold water, oil, gas and similar fluids, the Crane Company, Chicago, is offering a line of brass globe (No. 14-½-P) and angle (No. 16-½-P) valves with plug-type discs of Crane nickel alloy and body seat rings



Cross-Section Through the New Brass Globe Valve

of Exelloy, a specially heat-treated chromium iron. This combination of metals is considered ideal for seating surfaces and the metals are said to have excellent resistance to wear, galling and scoring, and the effects of temperature.

Made in ⅛-in. to 3-in. sizes, these valves are recommended for use under a steam working pressure of 150-lb. per sq. in. and a pressure of 300-lb. on cold water, oil or gas lines. It is said that the wide seat bearing is unusually resistant to wire drawing and foreign matter, and that the tapered discs permit easy flow regulation when throttling. The stuffing box of each of the valves is fitted with a gland and may be repacked while under pressure when the valve is wide open. These valves are similar to the Crane 14-P and 16-P brass valves and if it is desired to convert the latter valves to the new line, all that is necessary is to secure new discs and seats, all parts being interchangeable.

New F-M Vertical Centrifugal Pump

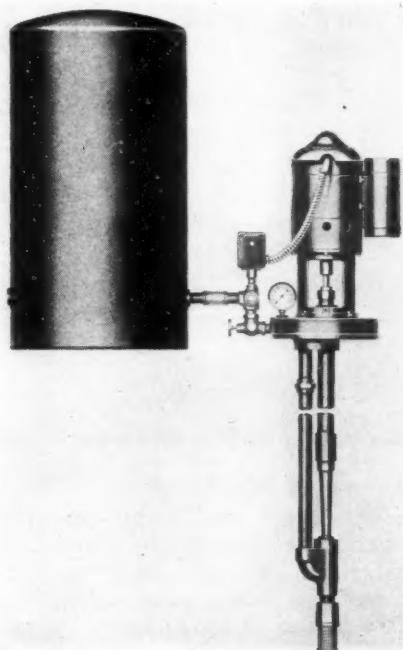
FAIRBANKS, Morse & Company, Chicago, has placed on the market a new vertical close-coupled motor-driven centrifugal pump, known as the Fig. 6640 pump, which is designed for general service in both deep and shallow wells. This pump was designed to meet the need for a small-diameter, low-capacity pump with low initial and operating costs. It is said to be capable of pumping water economically under either high or low pressure at 6 to 60 gal. per min.

Units for shallow-well service consist of a motor and pump mounted on a base, into the bottom of which is

screwed a suction pipe extending below the water level. This set-up is said to be satisfactory for water lifts of 15 to 20 ft.

When used in deep-well service, involving water-lifts of 20 to 200 ft., the pump is equipped with an ejector and venturi in one of two drop pipes extending from the pump down into the well. By allowing a predetermined amount of water from the pump discharge to bypass down one of the drop pipes in the well and back up through the injector into the venturi, a vacuum is created above the ejector nozzle, drawing well water into the suction chamber. The high velocity of the water through the venturi and the mixing of the two streams of water lifts the well water to within reach of the pump suction. Thus, the deep-well pump operates on the accepted principle of the centrifugal pump, with the ejector lifting the water from depths beyond that from which a centrifugal pump alone will lift it.

The new pump is compact in construction and occupies only a small amount of space. It is said to be sim-



A Fig. 6640 Ejector Centrifugal Pump for Deep-Well Service, With Pressure Tank and Automatic Controls

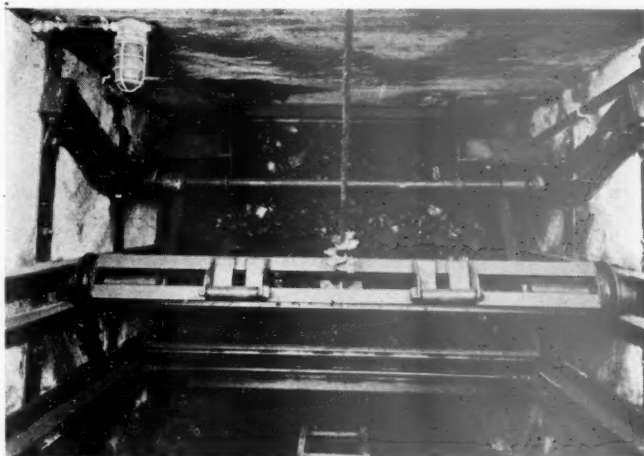
ple in design and quiet in operation, and to require a minimum of attention, no lubrication being necessary. There are no mechanical moving parts below the ground.

Improves N & W Type Direct Engine Coaler

AS a result of improvements incorporated in the N & W type direct electric engine coaler of the Ross & White Company, Chicago, it is now possible to install this coaler with a pit that is 1 ft. 3 in. less in depth than that permitted by the original design. In other words, the present design of the equipment is such that a skip bucket of 50 cu. yd. capacity can now be operated in a pit that is only 5 ft. 6 in. deep below the bottom of the receiving hopper. This shallow feature, it is pointed out, reduces excavating costs and is particularly desirable when the coaler is to be installed at locations where excavation is expensive.

The shallower bucket pit was made possible by chang-

ing the shape of the bucket in such a manner as to permit it to remain in the horizontal position in the pit while receiving its load. In the new design, moreover, curved



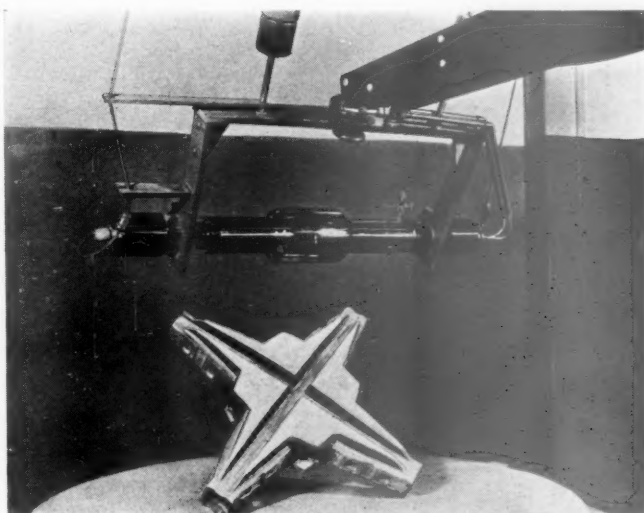
Looking Down into the Bucket Pit of the Ross & White Direct Electric Loader

bucket guides have been eliminated and it is not necessary to force the bucket out of its normal position, thus permitting smoother operation of the bucket and loader as a whole.

New Crossing Has "Depth Hardness"

THE American Manganese Steel division of the American Brake & Shoe Foundry Company, Chicago Heights, Ill., has placed on the market through track-work manufacturers a new type of crossing known as the AMSCO "Depth Hardened" Safety Crossing. This new crossing is of unique design and undergoes an improved hardening process.

The design is the result of much field study and laboratory research in which the company's 400,000-volt X-ray aided greatly in determining casting soundness and in indicating changes in foundry practice necessary to avoid imperfections. The individual castings are cast



AMSCO "Depth Hardened" Crossings Are Inspected by X-Ray

with raised pads on the receiving surfaces, and are hollow under the flangeways and receiving surfaces. Thus, with no integral ribs or supports to defeat proper feeding and heat-treatment, the finished casting has metal sections that are as uniform as possible.

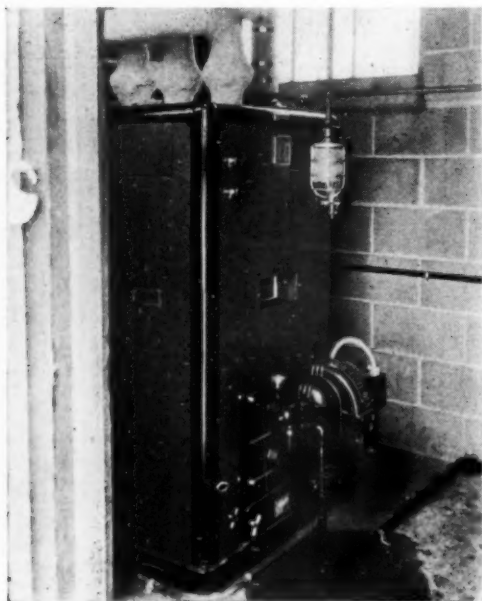
To secure the desired depth hardening an anvil made to shape is inserted under the hollow bottom after preliminary grinding of the crossing, and the receiving surfaces are subjected to an intensive work-hardening by a heavy steam hammer with special hand tools to precondition the receiving surfaces. This preconditioning is said to produce a wear and impact-resisting hardness in the receiving surfaces to a depth far below the line of maximum wear. After final grinding, a manganese steel grid is welded into position in the casting to insure a strong load-supporting structure under the flangeways.

Because of the sounder metal and better heat-treatment that is made possible by the simplicity of design and the elimination of castings with hidden defects by means of X-ray examination, the maker claims much greater safety for this crossing; because of the depth hardening of the receiving surfaces, longer life, reduced maintenance, smoother riding, and lessened shock and resulting wear to rolling equipment are expected. The casting is made in solid-quarter, reversible-quarter, or half-crossing sizes.

Installs Boiler Unit For Heating "Set-Out" Car

AN example of the application in railroad service in an unusual manner of an established product is afforded by a car-heating installation on the Chicago & North Western at Oshkosh, Wis. At this point, where no central steam plant is available, it was necessary to provide for the heating of a Pullman car that is set out each night, and to accomplish this purpose a small oil-burning boiler unit, manufactured by the Crane Company, Chicago, and designated as Model D16S, was installed. A small building of concrete block construction, located adjacent to the siding on which the car is set out, houses the heating plant.

During the period of the day when there is no demand on the steam plant the boiler water is automatically



View of the Crane Heating Unit on the North Western at Oshkosh

maintained at a temperature somewhat below the boiling point but sufficiently high to prevent its freezing. When the necessity for steam arises, the plant is placed in operation by throwing an electrical switch, after which the desired steam pressure is maintained with the aid of automatic controls until the switch is again thrown. The proper water level in the boiler is maintained at all times by means of an automatic feed-water device.

A New Type B Adjustable Rail Brace

A NEW adjustable rail brace conforming to the specifications for Type B, shown on Drawing 240 of the portfolio of trackwork plans, of the American Railway Engineering Association, which require that braces of this type shall "fit the web and top of base of rail," has been placed on the market by the Cleveland Frog & Crossing Company, Cleveland, Ohio. All parts



Parts and Assembled View of the New Type B Rail Brace

are of malleable iron, except two $\frac{7}{8}$ -in. heat-treated clamping bolts and two heavy-duty spring washers.

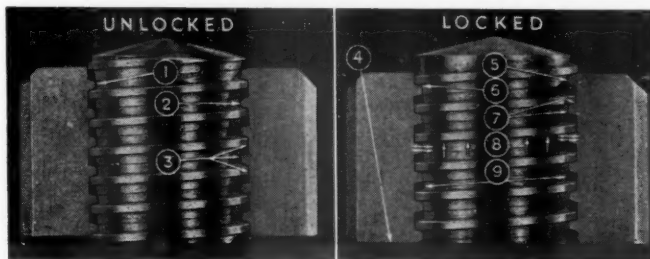
In addition to the bolts and washers, the assembly consists of the brace, a wedge, a washer plate and two acorn nuts. The upper face of the wedge and the lower surface of the toe of the brace contain serrations which mesh when the brace is applied in final position. The installation is made by inserting the bolts, which have square shoulders and countersunk heads, through the switch plate with the threaded ends up. The brace is placed over the bolts and against the rail, after which the washer plate, springs and nuts are assembled and the nuts screwed down to compress the washers slightly. The wedge is inserted with the serrations up and driven into place and the bolts are tightened securely.

It is claimed that the brace compensates for tolerances in the planed seat, in the width of the rail base and in the length of the brace itself and that it does not require adjustment after installation. It is said that since the top surface of the brace is closed, brine, mud, etc., are kept from the planed surface of the plate, thus minimizing corrosion, and that the closed-end acorn nuts protect the threads of the bolts from rust. It is also said that the tension in the bolts holds the rail so tightly to the plate that the brace acts as an anti-creeper. It is claimed that by changing only the brace, the plate and the remainder of the assembly can be used with various sections of rail. An application of these braces to a switch is illustrated in another column, in connection with a description of a swivel clip manufactured by this company.

Improved Self-Locking Screw Thread

A NEW self-locking screw thread profile has been developed by the Dardelet Threadlock Corporation, New York, for application to track bolts and nuts. As in the original Dardelet thread, the root of the bolt thread (1) is tapered 6 deg. with the axis of the screw. In the new "Relieved Profile," however, the root is stepped at the midpoint, the lower (or inner) step being undercut 0.003 in. to 0.005 in., depending upon the nominal diameter of the thread. The tapered crest of the nut thread (2) remains the same as in the original profile. The clearance (3) which exists between the assembled nut and bolt threads permits a limited axial displacement which provides for the locking action.

On first assembly this clearance permits only a line contact between the locking surfaces of bolt and nut threads; hence none of the initial wrenching effort is consumed by the locking surfaces. Continual wrenching effort, however, increases the bolt tension sufficiently to change the position of the nut thread relative to the bolt thread, and gradually forces the nut thread upward along the tapered slope of the bolt thread root to the point of its greatest diameter. Thus, the locking action is built up gradually by slowly increasing the area of the locking



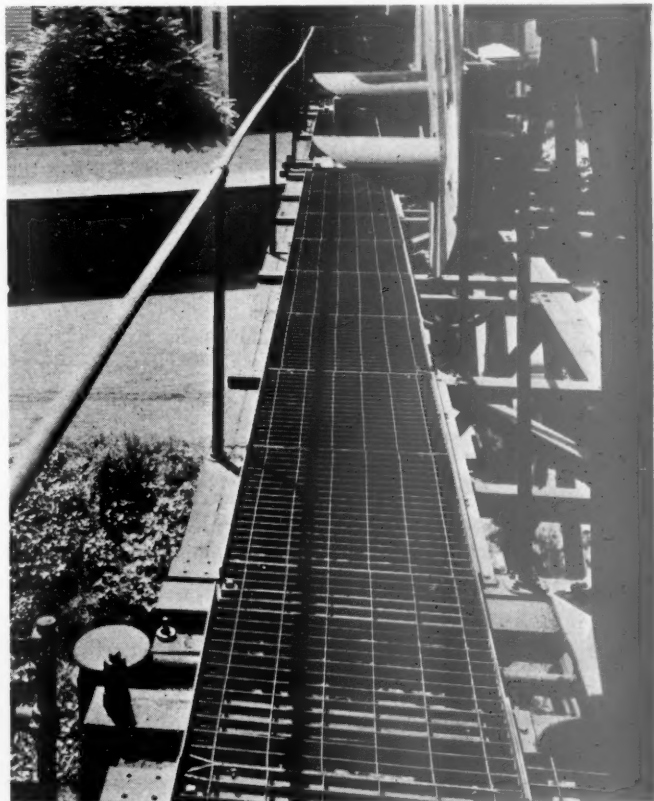
Cut-away Views of the Thread in the Unlocked and Locked Positions

surfaces in contact. With the abutting thread flanks in contact (6), additional wrenching will develop the required bolt load or stress while maintaining the lock. It is claimed that the bolt tension is distributed between the flanks or sides of the bolt thread ridge and the bolt thread root or locking surface (7), and that the locking stresses function at approximately right angles to this bolt tension (8). From this it is claimed that the lock is not affected by loss of bolt tension, vibration, or wear of the bearing surfaces of the assembled members.

New Adaptions For Wrought Iron

THREE new uses for genuine wrought iron in railroad service have been pointed out by the A. M. Byers Company, Pittsburgh, Pa. One of these involves the use of light wrought iron bars in the fabrication of open grating floors for signal bridges. Because these floors are subjected constantly to the effects of locomotive smoke, the corrosion-resisting qualities of wrought iron are valuable. The illustration shows a grating installed on a signal bridge over the tracks of the Pennsylvania at East Liberty (Pittsburgh), Pa. This grating is pressure-formed by forcing $\frac{5}{8}$ -in. by $\frac{1}{8}$ -in. transverse bars into dovetails in $\frac{3}{4}$ -in. by $\frac{3}{16}$ -in.

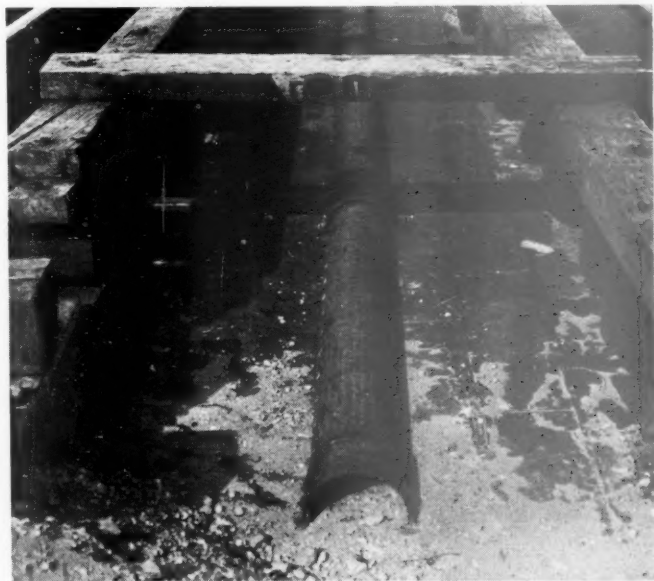
bearing bars. For this bridge the bearing bars, spanning 24 in., are spaced $1\frac{3}{4}$ in. on centers, while the crossbars are spaced 4 in. center to center. The grating, fabricated in sections by the Hendrick Manufacturing Com-



Open Grating Floor of Wrought Iron on Signal Bridge Over the Tracks of the Pennsylvania at East Liberty, Pa.

pany, Carbondale, Pa., was supported on steel angles bolted to the frame.

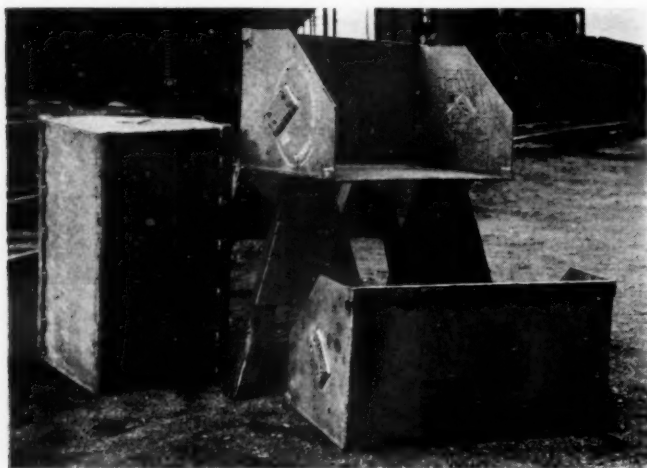
Another new application of wrought iron is the use of $\frac{1}{4}$ -in. plates, perforated along both edges and formed into half-pipes, to serve as floor drains beneath the bal-



Semi-circular Floor Drains of $\frac{1}{4}$ -117 Wrought Iron Plates in Place on Waterproofed Bridge Deck

last on waterproofed bridge decks. The Pennsylvania has placed such drains on six bridges in the last two years.

The Baltimore & Ohio has recently used wrought iron



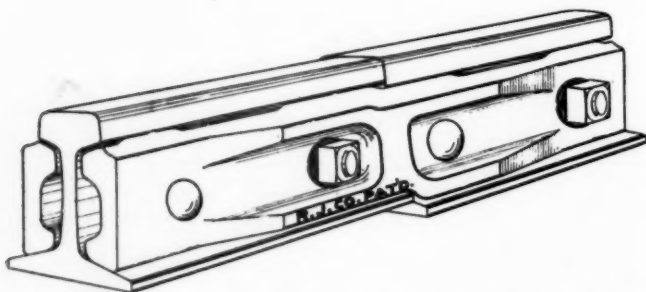
Wrought Iron Sheets Form These Coal Elevator Buckets for the B. & O.

in the fabrication of buckets for endless-chain type elevators in coaling stations. Owing to the rapid loss of section that occurs in a service that subjects the metal to the combined action of corrosion and abrasion, the use of a metal possessing high resistance to corrosion was deemed desirable.

Controlled Bearing Compromise Joint

THE Rail Joint Company, New York, has developed a new design of compromise rail joint that incorporates the principles of the controlled bearing and also embraces a tapering of the upper and lower flanges at the ends of the bar as a means of saving weight. The joints are made of cast alloy steel, having a tensile strength of 100,000 lb. per sq. in. and an elastic limit of 60,000 lb. per sq. in.

This controlled bearing design was developed because of the greater assurance it affords of securing a good fit against the fishing surfaces at the ends of two rails of



Compromise Rail Joint Has Tapered End-Flanges to Save Weight

different dimensions, at least one of which is normally an old or worn rail. Because of the high local stresses introduced by the abrupt change in section required in

compromise bars, the cross section of the bars at the joints is much heavier than is necessary near the ends of the bars. Consequently a considerable saving in weight has been effected by chamfering away the flanges so that the ends of the bars are toeless. This feature has an added advantage in that it facilitates the driving of spikes.

In designing these bars for various combinations of rail sizes, the designers have endeavored to maintain dimensions that permit the use of track bolts conforming to the standard lengths used on various roads.

New Asbestos-Cement Siding Shingles

EQUALLY practical for new construction and for sidewall renewal are the new "Eternit" shingles placed on the market by the Ruberoid Company, Baltimore, Md. Made of portland cement reinforced with asbestos fibres, the shingles are built up layer upon layer to produce a material having a "stone-like hard-



"Eternit" Shingles Can Be Applied Directly Over Old Wall Covering

ness." These shingles may be applied directly over the old sidewalls and when so applied, provide an added layer of insulation. This form of siding is claimed to be fireproof, rotproof, and never requires repainting. It is available in either a weathered-cypress finish or a brick-like finish.

New F-M Duplex Pump Has Easy Access Valves

A NEW duplex steam pump suited to railroad applications has been placed on the market by Fairbanks, Morse & Company, Chicago. This new "Fig. 6285" pump with an eight-cover side-pot type fluid end and an improved piston-valve steam end is said to offer an economical means of handling water, oil, or other free-flowing liquids at high pressures and in large quantities.

The fluid end is especially designed to permit easier

servicing of all valves. Each suction and discharge valve is located in its own valve-pot, and is accessible through the removal of its own valve-pot cover. The

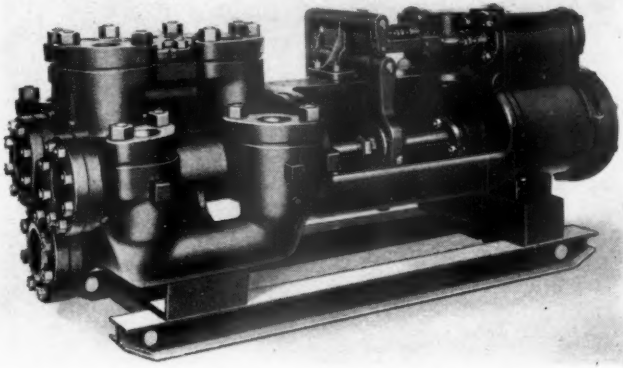


Fig. 6285 Pump With Side-Pot Valves

balanced, piston-type steam valves operate by direct lever action. Valve openings close completely, without loss of pressure, assuring efficient operation, it is claimed, even with high steam pressures and with superheated steam. The cradle between the steam and fluid ends has been made long enough to permit ready access to stuffing boxes, and so that no part of the piston rod enters both boxes.

Sizes are available for capacities up to 148 gal. per min. and fluid-end pressures up to 1,000 lb. per sq. in.

Surface Material For Parking Roofs

AS a result of tests which the Stonhard Company, Philadelphia, Pa., has conducted with its Stonhard resurfacer to determine the resistance of this material to the abrasion of automobile tires as well as weathering action, this company is now promoting the use of this product as a wearing surface on flat roofs of railway buildings that are adapted for use for automobile parking.

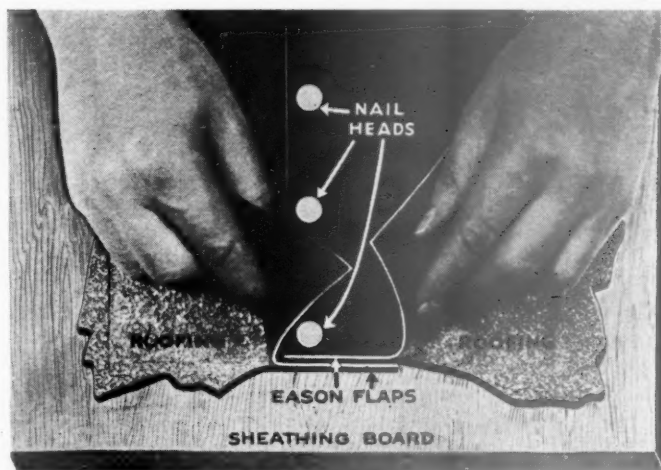


Roof Used for Parking Cars Finished with Stonhard Resurfacer

Stonhard resurfacer, a material which is mixed with coarse sand, portland cement and water, is applied in the same manner as in finishing concrete. It can be spread directly over the existing wood, brick, concrete, asphalt, or composition floors and roof surfaces, and is said to produce a resilient, dustless, and waterproof surface of great durability.

Interlocking Flaps for Roll Roofing

THE Ruberoid Company, Baltimore, Md., has recently improved its basic waterproof roll roofing by the addition of flaps along both selvages. The two flaps from adjoining sheets fold into an interlocking seal 2 in. wide at each lap joint, the whole joint then being covered with asphalt seam cement. By the use of the new flaps, it is pointed out, the nail heads are protected from water by a double layer of waterproof



"Eason" Flaps Interlock Over Nail Heads at Each Lap-Point

fabric, and there is no exposed lap edge of the roofing for the wind to raise or for water to penetrate under. Another feature, for which ease of application is claimed, is the fact that the 2-in. lap width is automatically marked by the folding lines of the flaps and thus eliminates the need for marking off the lap lines. "Eason" flaps, as the patented flaps have been named, are attached identically to both longitudinal edges of the roofing; thus the roll remains symmetrical and compact.

New Dusting Powder For Killing Weeds

THE Chipman Chemical Company, Inc., Bound Brook, N. J., is now marketing a new weed-killing dusting powder, known as Atlacide Chlorate weed killer, which comes packed in 100-lb. steel drums as well as in 4-lb. duster tins with sifter tops for spot dusting. This compound is non-poisonous and as soon as it is exposed to the air it absorbs moisture and does not dry out. Atlacide is intended for use at locations that cannot be reached by track-mounted equipment, and for application to scattered patches of weeds and grasses.

The dust is easily visible and after a few minutes' practice the operator can readily determine how to obtain uniform coverage. It is said that the effects of application of this powder are not apparent to the eye until 10 to 14 days after dosing, since this period of time is necessary for the chemical to be absorbed by the plant and to destroy the roots.

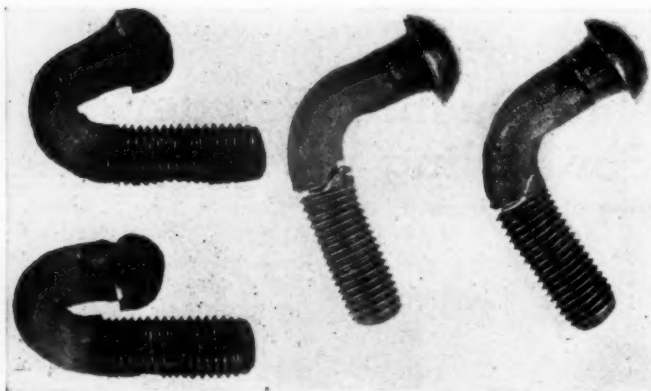
Double-Treating Improves Track Bolts

DDOUBLE Treating is the name that has been adopted by the Oliver Iron & Steel Corporation, Pittsburgh, Pa., to describe the process applied in the manufacture of track bolts for the purpose of effecting an improvement over the process generally employed. Bolts manufactured according to the Double Treating process are said to possess superior physical properties.

In the usual routine bolts are heated to a forging temperature and after hot heading and thread rolling, are time-quenched from the forging heat. This practice is said to have a disadvantage in that the temperature at the time of entering the quenching bath is not always the same, with resulting variations in the physical properties of the bolts, regardless of the care taken to control the time that the bolts are in the quenching bath.

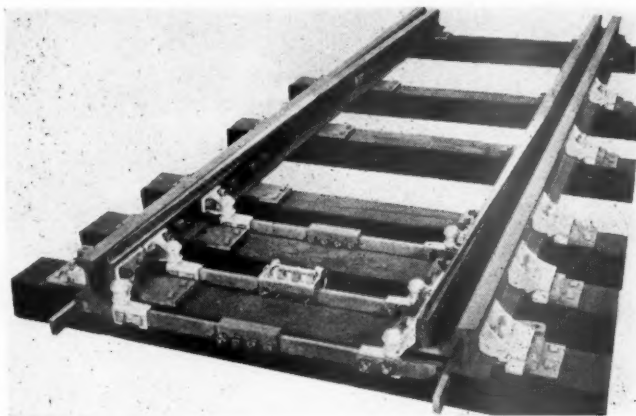
To overcome these limitations, the Oliver Iron & Steel Corporation has adopted the practice of reheating the bolts to a predetermined temperature after they have been forged but before subjecting them to a full quench and a draw. It is said that this compensates for hardness variation due to sectional differences in the bolt; for example, it insures that the properties of the metal will be the same in the threads as in the shank.

Among other claims made as a result of comparative tests of time-quenched and double-treated bolts are that at a specified tensile strength the ductility of the double-treated bolt is much higher than that of the time-quenched bolts, the reduction of area is approximately 50 per cent greater and elongation is about double. It is said also that double-treated bolts, when measured by Brinell tests, are satisfactorily uniform in hardness throughout the entire length of the bolt, while time-quenched bolts vary greatly in hardness between the shank and the threaded section. Laboratory impact tests have indicated that the values of "double treated" bolts are consistently 50 per cent higher than time-quenched material.



New Switch Clip For High Rail Sections

WITH the purpose of applying the thrust from switch rods, particularly on heavy rail sections, higher on the web of switch points than is done with present designs of switch clips, the Cleveland Frog & Crossing Company, Cleveland, Ohio, has developed a swivel clip for connecting the switch rods to the switch points. The swivel clip consists of two machine-fitted malleable-iron castings. The swivel-pin portion of the socket is $1\frac{1}{2}$ in. in diameter and approximately $2\frac{3}{8}$ in.

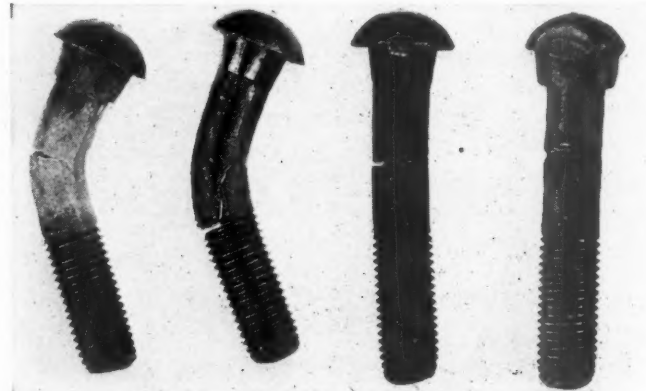


Switch Assembly with Swivel Clip and Adjustable Rail Brace

long, being designed to afford ample strength as well as to protect against wear and looseness.

Each clip is attached to the rod by two 1-in. heat-treated bolts. The rods are $1\frac{1}{4}$ in. by $2\frac{1}{2}$ in., in section with the larger dimension vertical. The clip is furnished in both adjustable and non-adjustable designs, the adjustment being in the connection of the clip to the rod, and provides adjustment independently for either switch point without disconnecting the throwing device. The center line of the switch rod is in line with the center of the pin, to avoid eccentric forces and to retain the rod in its original position. The clips are interchangeable, that is, they are not right and left hand, while the rod can be turned end for end at will.

Among the advantages claimed for the swivel clip are that by applying the thrust at a point high on the web, the top of the switch point is held more effectively against the head of the stock rail; and that the long vertical bear-



After Bending Test—Note the High Degree of Ductility in the Two Bolts at Left, Which Had Been Double-Treated. Compared With the Effect of Bending on Bolts of Varying Degrees of Hardness. Respectively These Other Six Bolts Had Been Quenched 5 sec., 10 sec., 15 sec., 20 sec., 25 sec., and Quenched Cold

ing of the socket pin assures proper fit of the points against the stock rails by preventing the tilting of the points. It is also claimed that the swivel action minimizes cramping of the movable parts, making the switch easier to throw, and that by placing the rods with the long diameter vertical there is less probability that they will be bent in service.

Use Rust Iron to Repair Bridge Seats

RUST joint iron is reported to have produced excellent results in repairing bridge seats on railroad bridges under conditions that are said to impose serious limitations on the use of other materials. Among the defects that have been corrected with this material is that resulting from the churning effect that takes place where failure to provide a uniform distribution of the load on a masonry plate results in a concentration of the load along its front edge. In such cases the plate gradually works its way into a depression that is deepest next to the outer edge.

In the cases reported, the condition that caused the churning was corrected by revising the design of the masonry plate to effect a uniform distribution of the load on the bridge seat, but this did not solve the problem of filling the depression under the plate and restoring the bridge seat surface to a level plane. One difficulty arose from the fact that the filling had to be introduced from the edges, since the span was necessarily left in place with the sole plate covering the churned-out area. Consequently the filling had to be of a type that could be poured or rammed into place. Another condition imposed was that the filling must be capable of taking load as soon as it is in place. These requirements led to the use of rust joint iron, manufactured by the Master Builders Company, Cleveland, Ohio.

After the span has been jacked up to bring the masonry plate to proper level and the depression has been cleaned out, this material, which comes in powder form (largely iron filings) was mixed with just enough water to form a stiff mortar—one that will form a compact ball. This was then rammed into place under the plate until the depression was completely filled.

The oxidizing agents in the mixture quickly reduce the iron filings to the form of a compact rust bed that is said to develop a high bearing strength in a short time. Some railway engineers have adopted the practice of sealing the joint around the edges by pointing it with portland cement mortar, contending that the oxidization takes place too quickly along the edges unless this is done. Others, however, claim that they have obtained good results without doing this.

New Veneer-Board For Interior Walls

NEWEST of the products of the Celotex Corporation, Chicago, is C-X Texbord, which has been developed to give the appearance of wood paneled walls at low cost. Texbord is suited to application on walls of offices, reception rooms, station interiors, restaurants, etc. It is made by applying genuine cabinet veneers of walnut, mahogany, or aodire to a Celotex



Texbord Gives the Appearance of Wood-Paneled Walls to this Office

tex base. Each unit is an individual plank with a grain different from every other plank.

Texbord is produced in planks $\frac{1}{4}$ -in. thick and 6, 9, and 12 in. wide, in either 8 or 10-ft. lengths. The planks have beveled shiplap joints, and all necessity for batten strips is eliminated since attachment to the wall is made under the joint so that no nailheads show. Texbord can be applied to any continuous surface without removing baseboards, mouldings or window casings. It is flexible enough to permit bending around archways and moderate curves.

Acetylene Floodlight Is Mounted on Cylinder

FOR railway construction and maintenance of way operations which must be carried on at night, such as rush projects and the coping with washouts, derailments, etc., The Oxweld Railroad Service Company, Chicago, has developed a new acetylene floodlight designed for attachment directly to the standard type of acetylene cylinder used for welding operations. So adapted for attachment to standard cylinders, it is expected that the availability of the new light for emergency operations will be greatly increased, especially



The New Light is Well Adapted for Tunnel Operations

on or about the railways where standard welding cylinders are, as a rule, on hand or else within easy reach.

The new light, which is furnished with a 13-in. reflector, gives off illumination of approximately 4,000 candlepower. For illuminating normal field operations it is most effective within a range of 100 ft., but it has a maximum beam range of approximately 400 ft. Designed especially for mounting on standard cylinders, the light possesses stability when set in place. Furthermore, the gas supply can be controlled readily by opening or closing the cylinder valve, as desired.

Another feature of the light is the special burner with which it is equipped, which, it is said, prevents the flame from being extinguished by high winds. This burner, which has a consumption of 1 cu. ft. of gas per hr., will afford approximately 200 hours of lighting from a standard cylinder, without adjustment.

N. R. A. A. Presented Exhibit in New Surroundings

(Continued from page 506)

sulated Wire & Cable Company, Chicago; Directors, H. H. Talboys, Nordberg Manufacturing Company, Milwaukee, Wis.; J. S. Hutchins, Ramapo Ajax Corp., Chicago; Jess Mossgrrove, Austin-Western Road Machinery Co., Aurora, Ill.; Thomas O'Leary, Jr., Johns-Manville Corp., Chicago; R. B. Fisher, Buda Company, Harvey, Ill.; and W. J. Hanna, Republic Steel Corp., Chicago.

At the annual meeting on March 15, Mr. Cowlin, president, reviewed the operations of the organization during the year, citing the many problems arising by reason of the change in location of the exhibit, and called attention to the substantial aid and encouragement that had been extended by both the American Railway Engineering Association and the Association of American Railroads in perfecting the arrangements for the exhibit. He stated that the cost of presenting the exhibit this year was fully as low as in any previous year, and that as a result a refund of 20 per cent will be made to all exhibitors. A preliminary report of the treasurer indicated that after all expenses have been paid, including the refund, a balance of \$30,330.27 will remain, or a gain of \$5,387.03. Secretary and Director of Exhibits C. H. White, reported that there were 127 members this year with 93 members participating in the exhibition.

Discussion

An extended discussion arose with respect to holding the exhibit on alternate years instead of annually, the final action being that prior to the date of allocating space in any year the directors will call for an expression from the membership concerning the advisability of holding the exhibit that year.

In the election of officers, Mr. Rodman was advanced to the presidency, H. H. Talboys, Nordberg Manufacturing Company, was elected vice-president, Mr. White was re-elected secretary and J. S. Hutchins, Ramapo Ajax Corporation, was elected treasurer. Directors elected for three years were: C. D. Young, Metal & Thermit Corporation, and R. C. Flodin, International Harvester Company.

New Books

The Economics of Rail Transport in Great Britain, Volume II, Rates and Service, by C. E. R. Sherrington. Second edition. 336 pages, 8½ in. by 5½ in. Bound in cloth. Published by Edward Arnold & Co., London. Price \$5.

In this edition, Mr. Sherrington has brought up to date the second volume of a work originally published in 1928 and reviewed in the *Railway Age* of January 26, 1929, page 256. This work of revision has included largely the replacement of data no longer applicable by more recent information and references to the outstanding events occurring in transportation since 1928. Thus a discussion of traffic pooling has been added to the chapter on the Railway Clearing House, a section on the London Passenger Transport Board (a public agency which now operates all local passenger-carrying agencies within the London area) has been included and an analysis of motor vehicle legislation has been appended to the chapter on highway competition. Three appendices have been added to the original edition which contain figures on traffic carried at special rates, enumeration of the British freight rebate provisions and a list of motor bus companies affiliated with the British railroads.

Portraits of the Iron Horse, The American Locomotive in Pictures and Story, by Otto Kuhler and Robert S. Henry. 80 Pages. 10½ in. by 8¾ in. Bound in paper. Published by Rand McNally & Company, Chicago. \$2.

When an artist who knows his engines and an enthusiastic student of railroad lore collaborate on a book devoted to the origin and "bringin' up" of the steam locomotive, the outcome is "Portraits of the Iron Horse". The text, which in itself constitutes a short but surprisingly complete history of the locomotive, is written by Col. Henry, assistant to the president, Association of American Railroads. Unlike most historical railroad sketches, it is not "tied" to a disconnected group of time-worn episodes through limitation of illustrations, but presents a coherent historical picture of the "flow of time" variety. Furthermore, its author avoids for the most part repetition of hackneyed material and gives the reader new, fresh anecdotes.

His chapter divisions remedy the usual monotony of chronological presentation by boiling down the necessary year-by-year narration of the early days of locomotives to the first chapter and "taking a fresh tack" for later developments. Thus in his second chapter "The Power of Steam" (and this is the high point of the book for your reviewer), Col. Henry first presents by simple illustrations the meaning of tractive effort, and the comparative demands placed upon the locomotive by grades, curves, cars, etc. Sizes of drivers and cylinders also come in for lucid explanation. This groundwork laid makes it possible to present further locomotive development by following the theme "What did engine builders do to get more power?" In like manner, his third chapter carries the thread further by discussing the types of the so-called Whyte classification and is properly entitled "Wheels and More Wheels". The final chapter discusses the "face-lifting" of the locomotive, a subject which appears to be close to the hearts of both Col. Henry and Mr. Kuhler, the illustrator.

The latter collaborator is well-known in railroad circles for his championing of locomotive streamlining and as a designer is the leader of that school which insists upon preserving the essential steam-locomotive appearance in all streamlining projects. The book's illustrations well reveal Mr. Kuhler's impeccable taste in bringing out what appeals most in every locomotive, be it even so bizarre a type as Winans ponderous "Camels". The sketches of early types contain examples hitherto unnoticed by popular railroad works and his illustrations of later locomotives depict the various types in settings so natural to each, that the whole would seem to be photographs, were not the illustrations pen-and-ink drawings. The captions under each picture are in themselves complete packets of information and are worthy partners with the text in telling the story of railroad steam power.

NEWS

Stedman Presents Gloomy Picture

Tells Wheeler committee that no pending reorganization plan will work

Testifying before Senator Wheeler's rail finance committee on March 10, John W. Stedman, chairman of important protective committees in the reorganizations of the Wabash and the Missouri Pacific, declared that no railroad now in receivership or trusteeship could be reorganized under currently pending plans. "The whole picture has to be improved permanently," he said, before reorganization can be successfully accomplished. He went on to say that "a plan is put out with the idea of restoring a railroad's credit, but I don't know what plan could restore a railroad's credit today."

During a discussion of the plight of the carriers today, Mr. Stedman said, "I don't believe the cure for a railroad's disease today is just the slashing of fixed charges. The fact is that the railroads do not enjoy economic equality." He also pointed out that railroads own their own rights-of-way and pay heavy taxes to the state and federal governments while buses and trucks use the highways and do not have to pay the same taxes. "It looks like a subsidy to me," he said.

Mr. Stedman told the committee that he felt that the apparent solution is for the government to do something to relieve the tax burden on the roads. He also told the committee that he did not think the Wabash plan, which was filed with the commission on January 24, would work on the basis of the last four months.

The March 10 session of the committee was devoted mainly to an examination of the plan of the receivers for the reorganization of the Wabash. Mr. Stedman and A. K. Atkinson, treasurer of the road, were the principal witnesses. Senator Wheeler observed that the new plan for the road called for total fixed requirements higher than the average annual income of the Wabash for the period from 1931 to 1935. Mr. Atkinson agreed that the average earnings during these years were hardly more than enough to meet the interest charges under the plan and went on to say that if the road earned only \$3,000,000 a year it would be "sailing pretty close to the wind." He also agreed with Senator Wheeler that the Pennsylvania will get about 56 per cent of the common stock and 34 per cent of all the stock of the new company under the proposed plan. During the hearing, Senator

Wheeler declared that "the Pennsylvania is likely to milk the Wabash for the benefit of its own line."

At the March 11 session of the committee, Senator Wheeler asked Mr. Stedman "how are we going to give the railroads a fair chance to earn a return on their investment?" Mr. Stedman didn't know, and at this point, the senator said that he felt that many of the railroad investors were going to have to take a loss so that the carriers' capital structure could be pared down to where they could earn a fair return on their investments.

During a discussion of income bonds, Mr. Stedman admitted that certain institutional holders take the view that income bonds are better in that they would fare better if the government took over the railroads. A confidential memorandum from the files of J. P. Morgan & Co. revealed that this firm believes that income bonds of the Missouri Pacific, as provided in the plan now pending before the commission, are nothing more than preferred stock. Mr. Stedman would not grant this position, maintaining that they did give the holder a lien on the property and gave him priority to claims of general creditors. He also pointed out that many states will not allow insurance companies and savings banks to hold preferred stock of companies, thus making the income bonds a better investment for institutional holders.

Stock Given for Overcharge Claims

Holders of overcharge claims which accrued against the St. Louis, Iron Mountain & Southern between 1907 and 1913 and which total \$94,799, must accept preferred stock of the road in exchange for their claims, according to a ruling by a special master in the federal district court at St. Louis, Mo. The special master recommended that the claims be classified in the reorganization proceedings of the Missouri Pacific according to the ruling. The claims were first filed in the reorganization proceedings of the railroad in 1915.

High Boiler Pressures—A Correction

On page 451 of the March 12 issue of the *Railway Age*, in a description of the Santa Fe 4-6-4 type locomotives, appears a statement to the effect that the 300 lb. boiler pressure of these locomotives had not been exceeded by any others built with the staybolt type of firebox. This statement is in error as the boilers of the Kansas City Southern 2-10-4 type locomotives described on page 113 of the January 8 issue have staybolt fireboxes carrying a working pressure of 310 lb.

More Merger Talk in the Dominion

But our Ottawa correspondent foresees no tangible result from discussion

Canada's railway problem is headed for another work-out, and again by a Senate committee. Two weeks ago Charles Beaubien, a prominent Montreal Conservative and a warm friend of the Canadian Pacific, moved a resolution in the Senate at Ottawa calling upon the Government of Premier King to do something soon about the railway problem to stop the ruinous loss annually caused by the operations of the Canadian National. He urged adoption of the unification plan submitted to the Senate during a committee probe in 1925.

Last week Arthur Meighen, Conservative leader in the Senate and Prime Minister of Canada in 1920 and 1921 when the three component parts of the present Canadian National system were being acquired, came out for the Beaubien suggestion, although he refused to declare himself flatly for or against unification. He did say he was sorely disappointed over the results of government ownership up to date and he also said that if the government continued its present attitude and policy Canada would have something worse than unification, something like what some provinces were experiencing now, namely bankruptcy.

Raoul Dandurand, government leader in the Senate, saw no good in another committee probe and declared that really the only solution of the problem was increased traffic. The debate was continued this week by James Murdock, a Liberal Senator and the spokesman of organized labor. He was minister of Labor in a former King Cabinet and is strongly opposed to any unification. All that will come out of the Senate committee probe will be more facts and figures about the condition of the two roads and guesses as to how much could be saved by unification, but Canada is still a long way removed from an actual experiment in unification.

Senator Dandurand said, "The stereotyped suggestion of \$75,000,000 or \$60,000,000 of savings under co-operation, or even under unified management, is at present, manifestly, a hopeless proposition. Apart from line abandonments, the co-operative measures which the two railways have put into effect since the passage of the Canadian National-Canadian Pacific Act of 1933, are estimated to have resulted in a joint annual saving of \$1,092,500. These

co-operative measures have had to do with the pooling of passenger services and the joint use of certain facilities. In the matter of line abandonments not a great deal has been accomplished, although a joint executive committee of the officials of the two companies has been giving continuous study to the possibilities of various proposals in this respect.

"Abandonment proposals are in two categories: (a) those relating to functionally duplicate lines, and (b) those relating to non-competitive thin-traffic lines. Those in category (a) are required to be dealt with under the Canadian National-Canadian Pacific Act of 1933; those in category (b) may be dealt with without reference to the Canadian National-Canadian Pacific Act, because no joint interest is involved, and each company may deal with such mileages as a purely company matter. But no mileage could be abandoned by either railway without the authority and approval of the Board of Railway Commissioners, which hears argument for and against all applications.

"To secure the economies referred to, the consent of the Board of Railway Commissioners would, as already stated, be required in every instance, as would also the consent of the bondholders whose investment in former privately owned lines would be affected. In addition, the wholesale abandonment of struggling communities of people who have settled along our colonization railways, and established industries which would be injuriously affected, would have to be considered. The \$75,000,000 saving claimed for unification takes no account of the possible demands for compensation from such sources, nor of the cost of compensating employees displaced, who are estimated to number 22,314, or 17 per cent, on the basis of last year's payrolls."

Club Meeting

The next meeting of the Railway Club of Pittsburgh will be held on March 24 in the Fort Pitt Hotel, Pittsburgh, Pa. H. H. Clegg, assistant director, Federal Bureau of Investigation, Washington, D. C., will speak on "Law Enforcement."

Net Income of Class I Roads

The Class I railroads' 1937 net income, after fixed and contingent charges, was \$98,526,717, as compared with \$165,483,528 in 1936, according to the Interstate Commerce Commission's compilation of selected income and balance sheet items. The December, 1937, net income was \$5,947,105, as compared with \$49,149,632 in 1936.

Rail Collision Kills 12 in Sicily

Twelve persons were killed when a Diesel rail car collided with a freight train on the Italian State Railways at Biocca, Sicily, about 5 miles from Catania, on the main line between Messina and Syracuse. According to news dispatches, the collision was due to false signal indications.

Conn to Speak at Jacksonville

Donald D. Conn, executive vice-president of the Transportation Association of America, Chicago, will speak at a lunch-

eon meeting of the Jacksonville Chamber of Commerce in the Seminole Hotel, Jacksonville, on March 23. He will be presented by Scott M. Loftin, co-receiver of the Florida East Coast.

A Freight-Forwarding Service for Users of Waterways Organized

The Waterway Carloading Company has been organized at St. Louis, Mo., to render a freight-forwarding service to users of barge service on the Mississippi. At present the service is performed between St. Louis and Baton Rouge, La. Future plans provide for the establishment of a truck pick-up service and extension of operation to Chicago and ports along the Ohio river.

"Enthusiast" Meeting

The next meeting of the Railroad Enthusiasts, Inc., New York division, will be held on March 25 in Room 2726, Grand Central Terminal, New York. Bob Butterfield, veteran engineman of the New York Central, will speak on his experiences in piloting crack trains. Moving pictures entitled "Flight of the Century" and "From Roundhouse to Roadbed," prepared by the New York Central, will be shown.

Chicago-Twin Cities All-Commodities Rates

The Chicago-Twin Cities all-commodities rate of 35 cents per 100 lb. has been found justified by the Interstate Commerce Commission in a recent decision. The report in I. & S. No. 4231 covered schedules under investigation, the suspension having been discontinued. The railroads involved published the all-commodities rate to meet a trailer-flat car rate established by the Chicago Great Western.

Pennsylvania Greyhound Route

Joint Board No. 60, composed of Fred F. Bays of Indiana and Noel F. George of Ohio has recommended in a proposed report that the Interstate Commerce Commission grant a common carrier bus certificate to the Pennsylvania Greyhound Lines, affiliate of the Pennsylvania, for operations over specified routes between Cardiz, Ohio, and Cambridge and between Brandt and the junction of U. S. Highways 35 and 40 in Indiana.

Motor Shipper Insurance Allowances

The Interstate Commerce Commission, Division 5, has found unlawful proposed motor carrier tariff rules permitting shippers to carry cargo insurance and to deduct the cost thereof from the gross transportation charges. The decision in I. & S. No. M-10 covers only schedules contained in Supplement No. 3 to Tariff M. F.-I. C. C. No. 3 of R. B. Osborn, doing business as Osborn Truck Lines, and Agent W. L. Myers' Tariff M. F.-I. C. C. 88, filed to become effective July 25, 1936, the commission refused to meet the request of parties and intervenors for an extension of the investigation "to include a general inquiry into the lawfulness of shippers' insurance allowances." The decision does say, however, that "our conclusions herein are, of course, indicative of those that we

would reach in other proceedings upon a similar state of facts."

The rates involved were sought to be published in connection with the truck transportation of shipments of four meat packers—Wilson & Company, Inc., the Cudahy Packing Company, Armour & Company and Swift & Company.

A "Pat on the Back" for Consumers' Counsel

Senator Schwollenbach of Washington addressed the Senate briefly on March 9 to give Consumers' Counsel John Carson a "pat on the back" in connection with the Interstate Commerce Commission's refusal to permit any Ex Parte 123 increases in rates on bituminous coal. The Senator thought that his colleagues were familiar "with the work Mr. Carson is attempting to carry out" and felt that the commission's refusal of the bituminous increases was due "partially, at least," to the brief filed by Mr. Carson in the rate case. Senator Schwollenbach obtained the necessary unanimous consent to have that brief printed in the Congressional Record.

No Debts Due Government Were Cancelled, Jones Explains

Chairman Jesse H. Jones of the Reconstruction Finance Corporation has issued a statement designed to clear up any misunderstanding in connection with the recent act of Congress, cancelling RFC notes given to the Treasury for monies disbursed by direction of Congress for relief and to other government agencies. He explains that no part of the amount involved in the act "was for loans to banks, railroads, insurance companies or to any other borrower from the Reconstruction Finance Corporation and no debt due the government by anyone was cancelled."

Some had construed the transaction "as a charge-off of RFC losses on loans," which "is not in accordance with the facts," Mr. Jones said.

Pension Finances

The Daily Statement of the United States Treasury for March 10 shows that up to that time there had been collected from carriers and their employees a total of \$123,565,318.16 in taxes under the Carriers Taxing Act which provides funds for the railroad retirement plan. Meanwhile the Railroad Retirement Board has spent \$3,519,718.08 to administer the Retirement Act.

The statement of the railroad retirement account as of February 28 shows appropriations by Congress totaling \$146,500,000 and benefit payments of \$48,485,654.52. The \$98,014,345.48 balance was accounted for by the \$70,000,000 invested in three per cent special Treasury notes; \$19,905,191.61 to the credit of the appropriation; and \$8,109,153.87 to the credit of the disbursing officer.

Corrected Report on Carbon Black Rates

The Interstate Commerce Commission has issued a corrected report in I. & S. No. 4337, Carbon black from and to Points in United States, which involves

one of the commodities withdrawn from the Ex Parte 115 rate increase application. The corrected report, superseding that noted in the *Railway Age* of February 26, page 393, summarizes the findings as follows:

1. Proposed increased rates on carbon black, in carloads, from producing points in Louisiana, Oklahoma, and Texas to Gulf of Mexico ports for export or coastwise movement found justified. Proposed rates on like traffic from other points found not justified.
2. Proposed increased rates on carbon black, in carloads, from producing points in Louisiana, Oklahoma, Texas, and Wyoming and other points to destinations in the United States and Canada found not justified. Schedules found not justified ordered canceled and order of suspension vacated insofar as it applies to schedules found justified.

Brotherhoods to Fight Pay Cut Program

Railroad brotherhoods will resist the plan of the railroads to reduce wages, as proposed by the Association of American Railroads on March 11. A. F. Whitney, president of the Brotherhood of Railway Trainmen, in a statement to the press, said that organization will press demands for government control of the carriers if they pursue their announced course of action. "The only other way, besides federal control, to cure their financial ills," he said, "is to write off watered capital structure and slash interest rates on bonded indebtedness to 3 per cent." Opposition to the proposed wage cut was also expressed by George M. Harrison, president of the Brotherhood of Railway Clerks and David B. Robertson, president of the Brotherhood of Locomotive Firemen and Engineers.

North Western Receives New Locomotive

The Chicago & North Western has received the first of nine streamlined locomotives, built by the American Locomotive Company, for operation in passenger service between Chicago and Omaha, Neb. These 4-6-4 type locomotives weigh 772,000 lb., 412,000 lb. being the weight of the

locomotive and 360,000 lb. the weight of the tender, which has a capacity of 20,000 gal. of water and 25 tons of coal. The locomotives are capable of speeds up to 120 m. p. h. They have a tractive effort of 55,000 lb. on 84 in. driving wheels. Each locomotive is 101 ft. 9¾ in. long, 16 ft. high and 10 ft. 10 in. wide.

Streamlining is effected through the use of ½ in. lightweight steel covering, which has been painted Pullman green and decorated in bands of gold extending from the tip of the locomotive to the tender. Other features of these locomotives include automatic lubrication, an automatic bell-ringer, and roller bearings. Delivery of the fleet of nine locomotives is, expected by the end of March.

Illinois Central Adopts Plan to Reduce Payroll Expense

A plan providing for the reduction of payroll expense by the elimination of positions and by vacations without pay has been placed in effect by the Illinois Central. Under the plan all employees, including officers, will contribute to the payroll reduction so that no particular group will be called upon to bear the entire burden. In that group of employees which enjoys wage and working contracts through the Brotherhoods, a ten per cent reduction in payroll is being accomplished through the elimination of positions. In the group of employees not covered by contracts, including officers not under contract, each employee is required to take ten days vacation without pay during April or May at such time as the employee chooses and the work of the department permits. The ten days may or may not be consecutive.

Car Service Division Consolidation at Cleveland

Consolidation under one head of the Cleveland (Ohio) Ore and Coal Exchange, the Open Top Car section of the Car Service division, and the office of District

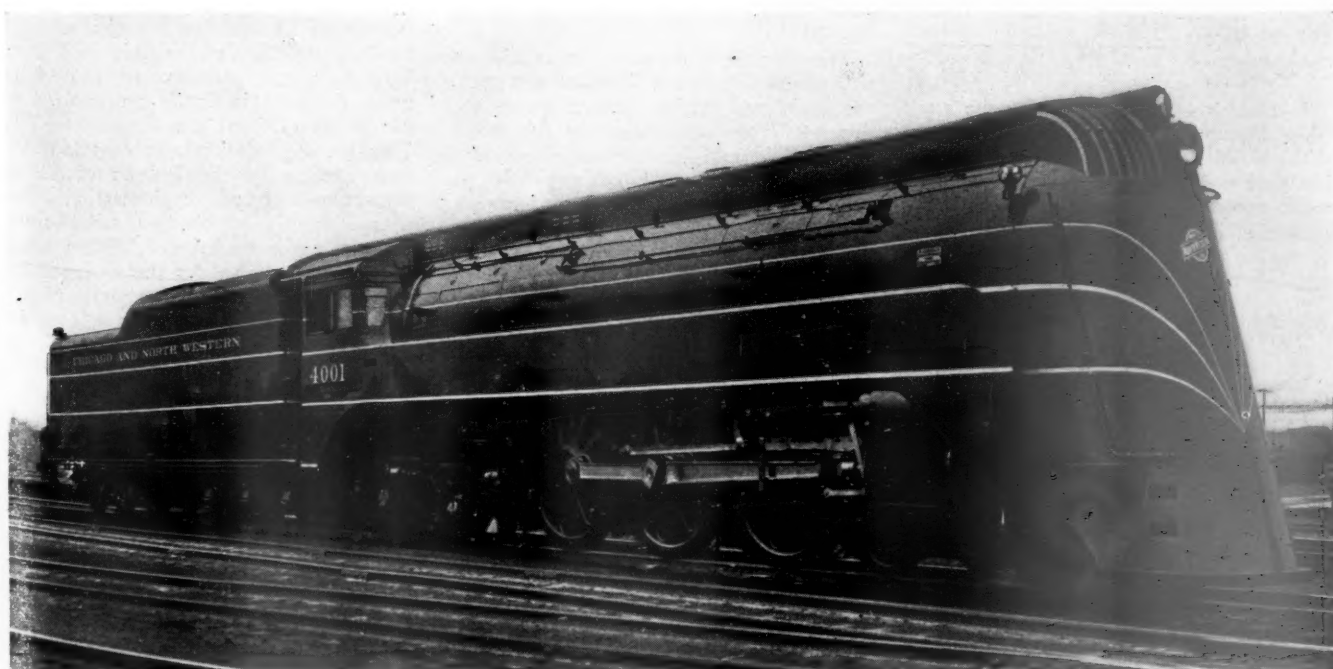
Manager of the Car Service division for the Lower Great Lakes was announced on March 12 by the Association of American Railroads. W. J. McGarry of Washington, D. C., who for 19 years has been manager of the Open Top Car section, has been appointed manager of the consolidated organization, with headquarters at 1101 Terminal Tower, Cleveland. At the same time, he will continue as the point of contact between the Allegheny, Great Lakes and Ohio Valley Shippers Regional Advisory Boards and the Car Service division.

The Cleveland Ore and Coal Exchange was established about 20 years ago by the railroads transporting coal to lower lake ports, for the purpose of co-operating with coal producers and trans-lake shippers, ship operators on the Great Lakes and the steel industry in facilitating the prompt movement of coal to upper lake ports and the return movement of iron ore.

The consolidation of these activities so far as the Cleveland Ore and Coal Exchange and the Open Top Car Section are concerned becomes effective on March 15, 1938. Effective on April 1, 1938, the office of the district manager of the Car Service division at Detroit, Mich., will be transferred to Cleveland where it will be under Mr. McGarry's direction. As a result of this consolidation, matters relating to mine ratings, supply and distribution of open top equipment will be handled by Mr. McGarry.

Iron and Steel to Texas Ports

The Interstate Commerce Commission, upon further hearing on Fourth Section Application No. 15151, has granted railroads fourth section relief to establish rates on iron and steel articles, in carloads, from producing points in Central, Western, and Southwestern territories to Texas ports, Lake Charles, La., and interior points in contiguous territory. Also, a proposed proportional rate on the same articles from Kansas City, Mo., to New Or-



leans, La., for shipments destined to certain points in Louisiana and Texas, together with proposed rate on these articles from Kansas City to New Orleans proper and intermediate points north thereof east of the Mississippi river, was found justified except for application over certain routes. The suspended schedules were ordered canceled and proceeding discontinued without prejudice to the establishment of rates approved.

Freight Car Loading

Loading of revenue freight for the week ended March 5 totaled 552,916 cars, an increase of 40,986 cars or eight per cent above the preceding week, but a decrease of 177,413 cars or 24.3 per cent below the corresponding week in 1937 and a decrease of 346,582 cars or 38.5 per cent below the same week in 1930. All commodity classifications except live stock and ore showed increases above the preceding week, but all commodity classifications except grain showed decreases under last year. The summary, as compiled by the Car Service Division, Association of American Railroads, follows:

Revenue Freight Car Loading For Week Ended Saturday, March 5			
Districts	1938	1937	1936
Eastern	122,793	168,365	138,583
Allegheny	104,289	154,678	121,799
Poconantas	35,619	55,651	49,719
Southern	91,353	113,847	101,821
Northwestern ..	66,064	79,375	75,180
Central Western ..	86,190	105,349	94,529
Southwestern ...	46,608	53,064	52,939
Total Western Districts	198,862	237,788	222,648
Total All Roads ..	552,916	730,329	634,570
Commodities			
Grain and Grain Products	33,039	28,230	36,960
Live Stock	10,697	11,437	11,166
Coal	106,733	159,558	133,195
Coke	5,884	11,932	8,206
Forest Products ..	26,932	36,209	30,765
Ore	6,805	10,717	6,453
Merchandise	151,498	171,063	159,113
L. C. L.	211,328	301,183	248,712
Miscellaneous ...	552,916	730,329	634,570
March 5	552,916	730,329	634,570
February 26 ...	511,930	692,393	672,869
February 19 ...	535,790	711,314	686,487
February 12 ...	542,991	688,523	631,095
February 5	564,740	671,227	621,686
Cumulative Total, 9 Weeks	4,964,790	6,208,235	5,579,434

In Canada.—Car loadings for the week ended March 5 totaled 45,554, as compared with 47,345 for the corresponding week last year and 46,322 cars for the previous week, according to the compilation of the Dominion Bureau of Statistics.

	Total Cars Loaded	Total Cars Rec'd from Connections
Total for Canada:		
March 5, 1938	45,554	23,068
February 26, 1938	46,322	21,064
February 19, 1938	44,705	21,255
March 6, 1937	47,345	30,083
Cumulative Totals for Canada:		
March 5, 1938	405,034	199,845
March 6, 1937	418,564	247,946
February 29, 1936	366,917	199,598

Greyhound Lines To Purchase New Equipment

The various Greyhound companies of the country have applied to the Interstate Commerce Commission for authority to issue a total of \$4,080,000 of serial equipment mortgage notes, the proceeds to be used to purchase new busses. The list

of companies and the amount of their applications follows: Atlantic Greyhound Corporation, \$480,000; Capitol Greyhound Lines, \$72,000; Central Greyhound Lines, \$180,000; Central Greyhound Lines, Inc. of New York, \$276,000; Dixie Greyhound Lines, \$300,000; Illinois Greyhound Lines, \$72,000; New England Greyhound Lines, \$120,000; Northland Greyhound Lines, \$480,000; Ohio Greyhound Lines, \$60,000; Pennsylvania Greyhound Lines, \$720,000; Southwestern Greyhound Lines, \$480,000; Teche Lines, Inc., \$120,000; and Pacific Greyhound Lines, \$720,000. The Greyhound Corporation has asked the commission for permission to guarantee the notes.

Would Uphold All-Commodity Rates

Examiner Claude A. Rice has recommended in a proposed report that the Interstate Commerce Commission dismiss the Middle Atlantic States Motor Carrier Conference's complaint against an all-commodity railroad rate of \$33 per car, applying between Jersey City, N. J., and Newark and Philadelphia and between Jersey City and Allentown, Pa., Bethlehem and Easton; and a \$44 all-commodity rate between Reading, Pa., and Jersey City.

Defendant railroads are the Central of New Jersey, the Lehigh Valley, the Pennsylvania and the Reading. The examiner says that "Less-than-carload merchandise, formerly moved by defendants in substantial volume between the considered points of origin and destination, was at one time nearly all diverted to highway carriers, and the assailed rates have enabled defendants to recapture but a small proportion of the lost tonnage."

Employment Still Dropping

Railway employment fell off another 2.08 per cent during the one-month period from mid-January to mid-February, according to the Interstate Commerce Commission's compilation, based on preliminary reports. The total number of employees as of the middle of February was 939,663, as compared with a mid-January figure of 959,670.

The drop in maintenance of equipment and stores forces was 3.33 per cent while the train and engine service group was down 2.87 per cent, reflecting the fall in traffic. The mid-February maintenance of way and structures force was 1.31 per cent smaller than that of the previous month.

The drop in total employment as compared with February, 1937, was 14.26 per cent, with maintenance of way and structures forces falling off 19.3 per cent; maintenance of equipment and stores, 21.54 per cent; and train and engine service, 13.86 per cent. The index number, based on the 1923-1925 average as 100 and corrected for seasonal variation, stood at 54.7 in February as compared with 63.8 in February, 1937.

Court Returns Land Grant Tract to Government

A recommendation made by a special master on July 27, 1937, that 315,000 acres in the Crow Indian reservation be given to the Northern Pacific was overruled by

Judge J. Stanley Webster in the federal district court at Spokane, Wash., on March 9. This ruling was made during oral arguments started the day before on the report made to the court on July 27 by Frank Graves, special master, which recommended that the Northern Pacific is entitled to full settlement for land granted it by the government under the Congressional acts of 1864 and 1870, with certain restrictions. In general, this report found that the government confiscated several pieces of land, totaling 2,377,220 acres, granted to the railroad. One major issue on which the special master held with the railroad was on the interpretation of the term "agricultural lands" as set forth in the grant, the railroad being allowed to take agricultural lands in indemnity belts to replace losses due to homesteading and mineral development of acreage lying within the original grant.

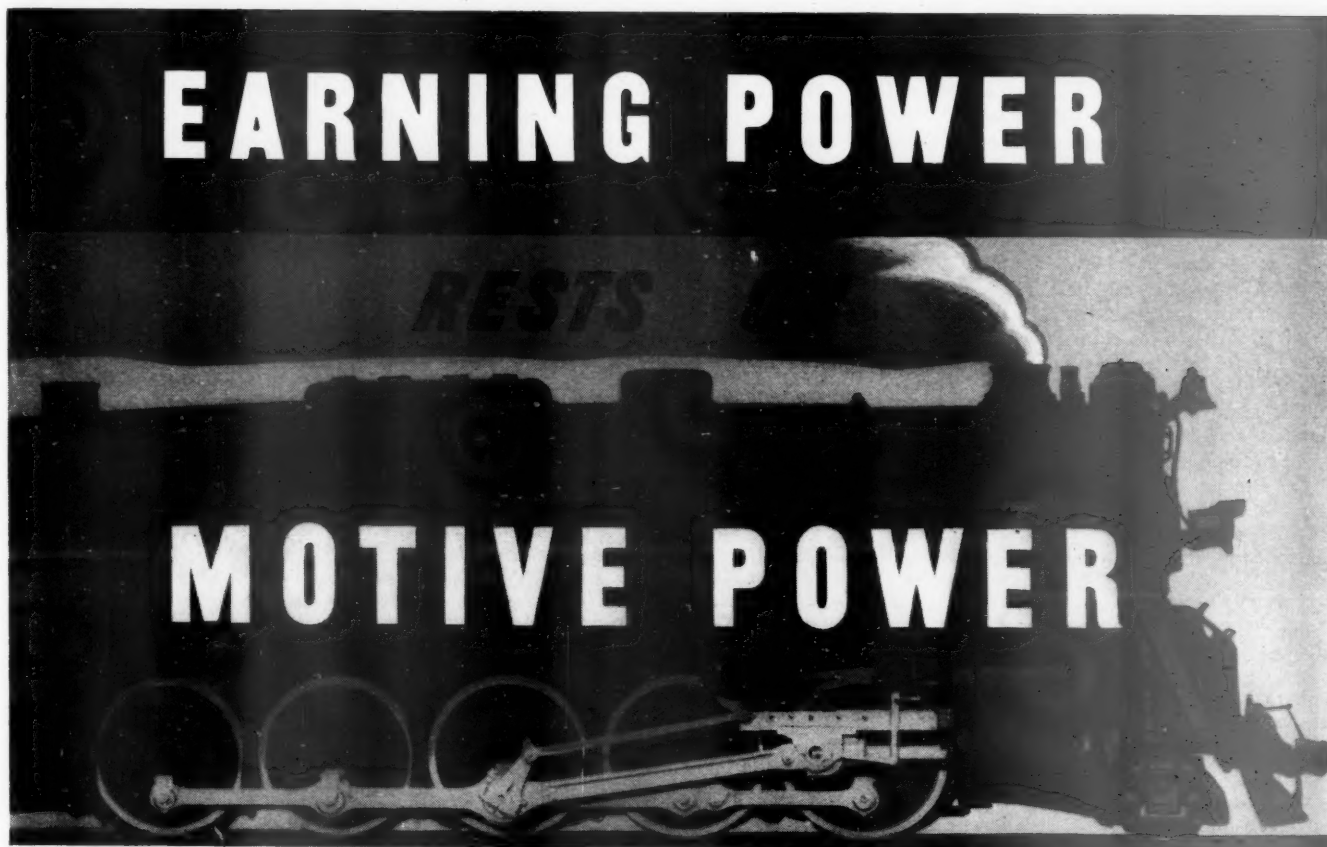
Judge Webster, in his ruling on March 9, held with the government's contention that inasmuch as the land in the Crow Indian reservation had been primarily excluded because it was Indian land and the railroad given land elsewhere in lieu of it the railroad had no right to file upon it later because the government bought it from the Indians. In this decision, made before all arguments were completed, the court concluded that the grant itself specifically barred the railroad from filing on the Indian lands in question and that the railroad had been reimbursed with land elsewhere for that reason. It concluded also that the fact that the government later decided to buy back this land from the Indians and make it part of the public domain did not give the railroad the right to violate the terms of the grant and file upon it.

On March 11 Judge Webster upheld the master in his ruling that "agricultural lands" in the grant meant all lands not mineral rather than strictly agricultural land as the government contended.

Bureau of Finance Proposes Tentative Plan for C. & N. W.

The Interstate Commerce Commission's Bureau of Finance has recommended that total capitalization of the Chicago & North Western should not exceed \$468,000,000 when the road is finally reorganized under Section 77 of the Bankruptcy Act. This recommendation was contained in a memorandum by the Bureau of Finance concerning total capitalization, fixed charges, contingent charges, and equity of the common and preferred holders in connection with a plan for the reorganization of the road. The total capitalization of the Bureau compares with the debtor's proposed total capitalization of \$470,767,288 and the group committee's figure of \$449,505,000.

The Bureau also recommended that the present stockholders be included in the plan of reorganization. According to its plan, not less than one share of new common stock should be issued for each five shares of the existing preferred and not less than one share of new common stock should be issued for each 10 shares of the existing common, in recognition of the existing equity of the holders of those classes of securities. But the Bureau



The increased earning ability of modern motive power justifies the replacement of many thousands of existing locomotives.

- Let earning power be the consideration that governs your choice between repairing old power or buying new locomotives.
- Do not perpetuate old locomotives that will be a drain on increasing revenues.



LIMA LOCOMOTIVE WORKS, INCORPORATED, LIMA, OHIO

pointed out that "If the earnings of the debtor during the depression period 1931-36 are considered alone there is grave doubt that the existing stockholders have any equity remaining in the property."

The fixed interest charges, including the sinking fund, should not exceed \$3,500,000 annually at four per cent, the total of this type of security being placed at approximately \$87,500,000. The memorandum also recommended the issuance of \$76,000,000 of 4½ per cent interest bearing securities with a fixed maturity, on which interest would be paid if earned. The remaining equity would be represented by 4½ per cent preferred stock and by common stock to be issued in approximately equal amounts and having a combined par value not exceeding \$304,500,000.

The Bureau goes on to say that the common stock could be issued without par value, provided that, for purposes of exchange for existing claims, the no-par stock is treated as having a value of \$100 a share.

The Bureau believes that a maximum sum of \$1,750,000 per year should be accrued as a fund for capital expenditures, with an appropriate limitation to be provided in the plan as to the total amount of the unexpended fund to be accumulated. This yearly sum should be accrued out of available earnings after payment of interest on fixed-interest obligations and their sinking fund requirements.

The recommendations have been prepared only as a guide to aid the commission in determining a new capital structure for the road when its final reorganization plan is issued, and are not to be taken as bearing the stamp of approval of the commission.

Motor Act Amendment

Senator Shipstead of Minnesota has announced his intention to propose an amendment to S.3606 which Chairman Wheeler of the Senate committee on interstate commerce recently introduced to effectuate Motor Carrier Act amendments recommended by the Interstate Commerce Commission. The Shipstead amendment would add to the act's section 207, dealing with issuance of certificates, a provision similar to that now contained in section 213, dealing with consolidations, mergers and acquisitions of control.

The proposed amendment would add to sub-section (a) of section 207 the following: "And provided further, That if a carrier other than a motor carrier is an applicant, or any person which is controlled by such a carrier other than a motor carrier or affiliated therewith within the meaning of section 5(8) of Part I, the commission shall not issue such a certificate unless it finds that the transaction proposed will promote the public interest by enabling such carrier other than a motor carrier to use service by motor vehicle to public advantage in its operations and will not unduly restrain competition."

Col. Molitor Dies; Had Long Engineering Career

Col. Frederic A. Molitor, a noted consulting engineer, and for many years en-

gaged in railroad construction and improvement, died after an extended illness at his home in Stamford, Conn., on March 12. He was 69 years old, having been born on April 21, 1868, at Detroit, Mich. Mr. Molitor received his education at Trinity School, New York, and Cornell University and entered the service of the Central of New Jersey in 1886, serving successively as instrumentman, draftsman and chief draftsman. In 1888 and 1889 he worked as assistant engineer on the Baltimore & Ohio, New York extension, and during 1889 and 1890 he served as principal assistant engineer with the Kentucky Central (now Louisville & Nashville).

Mr. Molitor then became engineer maintenance of way of the western division of the Chesapeake & Ohio, and served as general roadmaster of the Louisville Southern (now Southern) from January to October, 1891. From October, 1891, to September, 1894, he was engineer of the Philadelphia Belt Line; from September, 1894, to December 1895, engineer in charge of construction of the Montauk division of the Long Island; from December, 1895, to 1902, chief engineer, Choctaw, Oklahoma & Gulf and allied companies (now Chicago, Rock Island & Pacific); from 1902 to 1905, general manager and chief engineer, Midland Valley; and from 1905 to 1907, supervisory railway expert to the Philippine government. After studying railroad conditions and terminal problems in Europe and the Orient for a year, he returned to New York and opened an office as a consulting engineer in the railway field, in which connection he made numerous railroad studies and reports thereon. He was a member of the American Society of Civil Engineers, American Railway Engineering Association, American Institute of Consulting Engineers, American Society of Mechanical Engineers, Institute of Civil Engineers (Great Britain) and the Society of American Military Engineers.

Port of New York Authority Annual Report

The Port of New York Authority reported for the year ended December 31, 1937, a combined net income of \$5,502,448, as compared with a 1936 net of \$4,428,574. The Holland tunnel and the George Washington bridge continue to be the Authority's profitable enterprises and the Commerce building this year earned a net income of \$82,572, as compared with a 1936 deficit of \$39,653. The latter facility, which houses the Union Inland Freight station, is reported to have remained practically 100 per cent rented during the year. The Union Inland Freight station, a joint I.C.I. station for carriers entering New York, handled a total of 74,873 tons of freight, an increase of 5,438 tons or 7.8 per cent over 1936. The Railway Express Agency, which sub-leases a portion of the station from the carriers, handled an additional 110,884 tons, compared with 99,932 tons in 1936.

In connection with port development and protection activities, it is reported that conferences have been held with carriers serving North Atlantic ports regarding proposed departures from the long and short haul clause seeking to establish reduced rates to Toledo, Ohio, Cleveland and De-

troit, Mich., to meet competition with the New York State barge canal, which scale of rates, the Port Authority declares, gives the advantage of 40 and 60 cents per ton under New York to Philadelphia, Pa., and Baltimore, Md., respectively. The report points out "the inconsistency of giving port differentials to Philadelphia, Baltimore and Norfolk, Va., in the Great Lakes territory, which is geographically closer to New York and influenced by water competition primarily from New York, and at the same time maintaining a basis of rates to other Central territory points which ignore port differentials."

In connection with the proposed Greenville (N. J.)—Bay Ridge (N. Y.) freight tunnel (Belt Line No. 1), it is pointed out that a report of a fact-finding committee, representing the carriers concerned and the Port Authority, has been completed and submitted to a special committee of the Port Authority. During the year the Authority also completed a report on suburban transit for northern New Jersey, in which it reached the conclusion that, although such rapid transit facilities are necessary and desirable, they "cannot be self-sustaining at the existing railroad commutation rate levels unless supported by a plan for public aid." It further suggests that the task of providing such transit facilities be committed by the New Jersey legislature to an appropriate public agency.

Brake Shoe Company Publishes History of Braking

The history of braking in general and of the development of a satisfactory composition and shape for standard railroad brake shoes in particular is recorded in text and illustrations published by the American Brake Shoe & Foundry Co. in a 52-page, paper-bound book entitled "The Story of the Brake Shoe": The first section of the work is devoted to a chronological record of man's attempts to retard the motion of vehicles, from the wheel-spoke chain drags for steep descending grades first used by the Romans, through slow evolution of wedges, log drags, pole drags (invented by a Bishop Vernzeo in 1595 and serviceable only in descending grades in excavated cuts or defiles), the first wheel lever brakes as used on early English coal "wagons," on down to the early hand brakes placed on American railroad cars by Nicholls, of the New Haven, and Nathaniel Hodge.

The theme then shifts to efforts to construct a satisfactory continuous train brake operated by the engineman. Description is given of early British and American patents on pneumatic and steam brakes. Mention is made of the many and diverse "chain" brakes devised by such inventors as Stebbins and Wilson, and a passing note is made of the Creamer continuous spring brake of 1853, which applied all the brakes of the train when the engineman released the spring. Finally the triumph of Westinghouse is narrated and the latest refinements of the air brake, including the findings of the famous Burlington brake tests and the development of the clasp brake, are enumerated. Several pages of the development of adequate brake shoe

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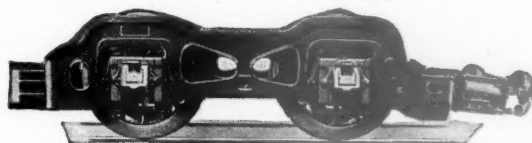
With increased speeds, track structures are suffering. A driving wheel load which is satisfactory at 60 miles per hour becomes questionable at 90 miles per hour. The factor of safety in track structures is endangered.

Lighter driving wheel loading is the solution and a new approach to locomotive design can supply it.

The solution incorporates the use of lighter driving wheel loads combined with the use of

the Locomotive Booster, thus restoring the starting and accelerating power and making it equal to, or greater than, the heavier, costlier and more destructive design.

The net result is a high-speed, high-capacity locomotive that lightens the punishment on track, thereby reducing maintenance.



When maintenance is required, a replacement part assumes importance equal to that of the device itself and should be purchased with equal care. Use only genuine Franklin repair parts in Franklin equipment.

FRANKLIN RAILWAY SUPPLY COMPANY, INC.

NEW YORK

CHICAGO

MONTREAL

testing machines and the laboratory work of the late F. W. Sargent close this chapter.

The last section of the book deals with the arduous search of railroad operators for a satisfactory material for brake shoes. As Mr. Sargent stated in the *Railroad Gazette* in 1905, they tried everything, including stone. Since it was found that cast iron required excessive renewals while wrought iron shoes gouged the wheel, attempts were made to imbed wrought iron in a base of cast iron to give both strength and mildness. Other combinations followed. Such attempts, it is stated, culminated in the so-called Diamond S shoe which was further improved by American Brake Shoe & Foundry. The use and perfection of reinforcements for brake shoes are also described.

Perfect Shipping Month Campaign Launched

A campaign to bring about the concentration of attention to methods of shipping during April, perfect shipping month, was launched by shippers and railroad representatives at a luncheon given by the Traffic Club of Chicago on March 15. During April an intensive study will be undertaken by manufacturers, warehousemen, wholesalers and retailers of the cause and prevention of loss and damage claims. The railroads and the express companies will co-operate with the regional advisory boards, as was done in April last year, to emphasize the importance of proper shipping.

Speakers at the luncheon included W. Y. Wildman, general chairman of the Mid-West Shippers Advisory Board, who outlined the purpose of perfect shipping month; J. M. Symes, vice-president of the Association of American Railroads, who discussed the extent to which the railroads will participate; and J. W. Brossard, vice-president of the Container Corporation of America, who outlined the benefits of proper container design and handling and discussed the responsibility for the selection of proper containers on the part of the manufacturer, the purchaser, the shipper, the warehouse company and the transportation agency. He estimated that 90 per cent of the shippers are not familiar with proper container construction because they have no knowledge of the condition of the shipment at destination.

Mr. Symes said: "The whole underlying thought behind this program is that of securing a sympathetic interest of shippers and receivers in developing the primary causes for loss and damage to freight. The carriers fully realize that, while this development will undoubtedly point the way to many improvements the shipper himself may make to the interest of safety to freight, the careful handling of freight in transit in all of its phases is the carriers' own responsibility. In recognition of this responsibility they have, over a period of 20 years, carried out a continuous and painstaking effort to eliminate bad practices and initiate good ones in the interest of safe handling and better service.

"The first effort to carry out this thought was the organization of prevention activities by the individual railroads. Another

was the formation of the Freight Claim division of the Association of American Railroads, which operates on a national basis in conjunction with nine regional freight claim conferences. The efforts of these groups are supplemented by the Freight Container Bureau, the Freight Station section of the Association of American Railroads, the Protective section of that association, and the individual and collective efforts of the operating departments of the railroads to insure the safe handling of cars on expedited schedules."

Equipment and Supplies

LOCOMOTIVES

THE CHICAGO, ROCK ISLAND & PACIFIC has completed negotiations with the Electro-Motive Corporation for the lease of 10 Diesel-electric switching locomotives. See *Railway Age* of February 26, page 399.

THE CANADIAN PACIFIC has placed orders for 25 locomotives; of these, 15 Pacific type have been let to the Canadian Locomotive Company, and 10 Hudson type to the Montreal Locomotive Works. It is expected that orders will also be placed within a few days for 10 Mountain type locomotives designed for high speed. Inquiry for the 10 Hudson type locomotives was reported in the *Railway Age* of January 8, page 138.

FREIGHT CARS

THE PHILLIPS PETROLEUM COMPANY has ordered 10 propane tank cars from the General American Transportation Corporation.

THE CANADIAN PACIFIC has placed orders for 2800 freight cars, divided as follows:

No.	Type	Capacity, Tons	Builder
1,000	Box	40	Canadian Car & Foundry Co.
50	Automobile		Canadian Car & Foundry Co.
200	Flat		Canadian Car & Foundry Co.
200	Stone		Canadian Car & Foundry Co.
950	Box	40	National Steel Car Corp.
100	Gondola		National Steel Car Corp.
200	Hopper	50	National Steel Car Corp.
50	Concentrate		Eastern Car Company
50	Refrigerator		Canadian Pacific Shops

Inquiry for this equipment was reported in the *Railway Age* of January 8, page 138.

IRON AND STEEL

THE CHICAGO, BURLINGTON & QUINCY has ordered 30,000 tons of rails and a quantity of track fastenings.

THE SOUTHERN PACIFIC is inquiring for 12,000 tons of structural steel for six bridges.

Supply Trade

Arthur G. Miller has been appointed district sales agent for the **Roller-Smith Company**, New York, with headquarters at Kansas City, Mo.

Cutler-Hammer, Inc., Milwaukee, Wis., has moved its Cincinnati, Ohio, office to the American building, Central Parkway at Walnut. **M. C. Steffen** is manager of this office.

A. H. Wobbe has been appointed assistant comptroller of the **American Car & Foundry Co.**, New York. Mr. Wobbe has been with the company since 1903, serving in various capacities in engineering, cost accounting, research and executive work.

Edward G. Budd Manufacturing Company—Annual Report

The Edward G. Budd Manufacturing Company reported for the year ended December 31, 1937, a net profit of \$1,219,423 after all charges and taxes. This compared with a 1936 profit of \$991,271, which includes an extraordinary income of \$635,970 in the form of dividends received on Budd International Corporation stock held by the reporting company.

The 1937 net was equivalent, after dividends on preferred stock of \$416,717, to 48.5 cents per share on 1,656,808 shares of common stock outstanding, as compared with 34 cents a share in 1936. The balance sheet as of the close of the year listed total current assets of \$9,925,070, including \$1,017,572 in cash; total current liabilities were reported as \$3,702,299.

Edward G. Budd, president, in analyzing the year operations of the railroad division of the company, points out that the continuous expansion of this division has involved large expenditures for development and that "it is gratifying to be able to report that during 1937 this division earned a profit even after writing off all development expenses." The company now has a capacity of 20 cars per month and it is declared that it can readily expand this capacity to 40 cars. According to the report the company delivered 93 cars in 1937, as compared with 33 in 1936 and 14 in 1935.

General American Transportation Corporation

The annual report of the General American Transportation Corporation and its subsidiaries for 1937 shows a profit of \$4,542,655, as compared with a net profit of \$2,966,414 in 1936. Current assets at the end of the year amounted to \$17,452,775 and current liabilities to \$4,610,516.

In commenting upon the year's operations in his report to stockholders, Lester N. Selig, president, said that "the company suffered practically no interruption of production in its plants during a year of labor unrest. Since its inception the company has always made a sincere effort to work with all of its employees on the basis of fairness and sympathetic understanding as to wages, hours and working conditions. It

NO. 13 OF A SERIES OF FAMOUS ARCHES OF THE WORLD

KYLLING BRIDGE NORWAY

Crossing the River Rauma stands this magnificent granite span, 250 feet in length and 193 feet above the river. It serves the West Norwegian Fjords and was nine years in the building since work could only be carried on in summer. » » » Security Sectional Arches for the locomotive firebox have also seen many years in arriving at their present stage of perfection. They embody every element of successful, satisfactory service and maximum economy.

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REFRACTORIES CO.**
Refractory Specialists



**AMERICAN ARCH CO.
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*Locomotive Combustion
Specialists*

has for some years had a liberal pension plan and a sound group insurance plan for their benefit." The consolidated summary of income for the year ending December 31, 1937, with comparisons with 1936, is shown in accompanying table.

	1937	1936
Gross income from sales, rentals, etc.	\$45,935,454	\$38,696,064
Cost of sales and expense	31,788,192	28,823,576
Selling, general and administrative expenses..	2,705,783
Operating profit — before depreciation ..	\$11,441,479	\$9,872,488
Other income:		
Dividends received ..	\$201,221	\$195,877
Interest earned	101,542	113,102
Profit on sale of securities	135,567	53,705
Amortization of premium on ten year notes	77,000	70,583
Sundry	133,739	135,181
	\$12,090,548	\$10,440,936
Deductions from income:		
Depreciation	\$4,894,025	\$4,859,316
Amortization of debt discount and expense	233,737	206,664
Interest paid	1,208,468	1,483,062
Federal income tax ..	775,000	561,142
Other charges	22,753	34,737
Net Profit (before provision for G. A. T. Compensation Plan) ..	\$4,956,565	\$3,296,015
Provision for issuance of 10,220 shares of company unissued stock in accordance with G. A. T. compensation plan approved by stockholders April 13, 1937 (computed at December 31, 1937, market price of \$40.50 per share)	413,910	329,601
Net Profit	\$4,542,655	\$2,966,414
CONSOLIDATED SURPLUS		
Capital		
Balance — December 31, 1936	\$43,614,469	\$36,887,790
Additions to surplus:		
Excess of market price at December 31, 1936, over par value of the \$5 per share of stock issued under G. A. T. compensation plan	307,140	6,726,697
Balance — December 31, 1937	\$43,921,609	\$43,614,469
Earned		
Balance — December 31, 1936	\$15,061,710	\$14,257,703
Additions to surplus:		
Net profit for year ended December 31, 1937	4,542,656	2,966,414
	\$19,604,366	\$17,224,117
Charges to surplus:		
Cash dividends on common stock (\$3.50 per share)	3,577,333	2,162,406
Balance — December 31, 1937	\$16,027,033	\$15,061,711

Westinghouse Electric & Manufacturing Co.

The Westinghouse Electric & Manufacturing Co. reported for the year ended December 31, 1937, a net income of \$20,126,408, as compared with a 1936 net of \$15,099,291, which constitutes an increase of 33 per cent and represents earnings of \$7.53 per share.

Orders received during 1937 amounted to \$229,540,061, an increase of 25 per cent over 1936 and second in rank only to the sales volume record of \$240,220,555 for 1929. Unfilled orders at the end of the year amounted to \$60,298,087, compared

with \$48,490,919 at the close of 1936, an increase of approximately 24 per cent.

The annual report to the stockholders further states that the company "had one of its best years with regard to orders entered, sales billed and net income."

The consolidated balance sheet as of De-

cey division, with headquarters at New York, to supervise railway sales activities. **C. D. Marvin**, formerly connected with the engineering advisory committee of the Van Sweringen railroads, has been appointed eastern railway sales representative of the Eveready division of the Na-

CONSOLIDATED INCOME AND SURPLUS

YEARS ENDED DECEMBER 31, 1937 AND 1936

	Year Ended December 31, 1937	Year Ended December 31, 1936
NET SALES	\$206,348,307	\$154,469,031
COST OF SALES:		
Manufacturing cost and distribution, administration and general expenses—including taxes (except federal income normal and excess profits taxes and surtax on undistributed profits), service annuities, operating reserves and depreciation of buildings and equipment	181,903,391†	135,335,814†
PROFIT FROM SALES	\$24,444,916	\$19,133,217
OTHER OPERATING PROFIT:		
Current operating results of subsidiary companies not consolidated in detail	1,973,838	1,129,048
PROFIT FROM OPERATIONS	\$26,418,754	\$20,262,265
INCOME CHARGES:		
Dividends and interest on investments (credit)	\$798,139	\$921,215
Excess and idle facilities expense	433,099	817,412
Flood rehabilitation expense, flood prevention dam and other non-recurring expense	709,992	1,875,960
Interest on bank loans	28,633
Other interest, discount and miscellaneous income, net (1936 credit)	256,826	197,084
TOTAL	\$630,410	\$1,575,073
NET PROFIT before provision for following federal taxes....	\$25,788,344	\$18,687,192
Income normal and excess profits taxes	\$4,367,653	\$3,180,430
Surtax on undistributed profits.	1,294,283	407,471
TOTAL	\$5,661,936	\$3,587,901
NET INCOME for the year	\$20,126,408	\$15,099,291
SURPLUS at beginning of year	45,546,779	45,205,865
SURPLUS before adjustments and dividends	\$65,673,187	\$60,305,156
ADJUSTMENT CHARGES:		
Adjustment in value of investments	\$898,504	\$106,706
Purchase of net assets of A. B. See Elevator Company, Inc. (credit)	669,999†
Miscellaneous, net (1937 credit)	67,659	15,045
TOTAL	\$160,845	\$121,751
SURPLUS before dividends	\$65,512,342	\$60,183,405
DIVIDENDS:		
On preferred capital stock	\$479,844	\$439,867
On common capital stock	15,527,385	14,196,759
TOTAL	\$16,007,229	\$14,636,626
SURPLUS at end of year	\$49,505,113	\$45,546,779

Provision for plant and equipment depreciation for all companies for 1937 amounted to \$4,782,530.15, compared with \$4,592,283.25 for 1936.

† Includes \$2,633,212.79 in 1937 for deposits into the Westinghouse Electric Annuity Trust for pensions, compared with \$1,296,765.03 in 1936. At the 1937 rate of deposit the liability thereunder will be funded in advance of requirements.

† Represents an increase in paid-in surplus, reflecting the excess of the balance sheet value of the A. B. See Elevator Company, Inc., at the time of acquisition over cost to Westinghouse of treasury stock, par value of new stock issued and other cost incidental to the transaction.

ember 31, shows current assets of \$132,100,471, as compared with total current liabilities of \$32,917,073 and a net working capital of \$99,183,398.

The consolidated income and surplus accounts for the years 1936 and 1937 are shown in the accompanying table.

The Columbia Machine Tool Company, Hamilton, Ohio, has purchased all the Long & Allstatter records, drawings, blue prints and patterns, and is prepared to furnish new improved design plate and structural steel machinery such as punches, shears, etc.

J. S. Gammel, eastern railway sales representative of the **National Carbon Company, Inc.**, has been transferred to the general sales department of the Ever-

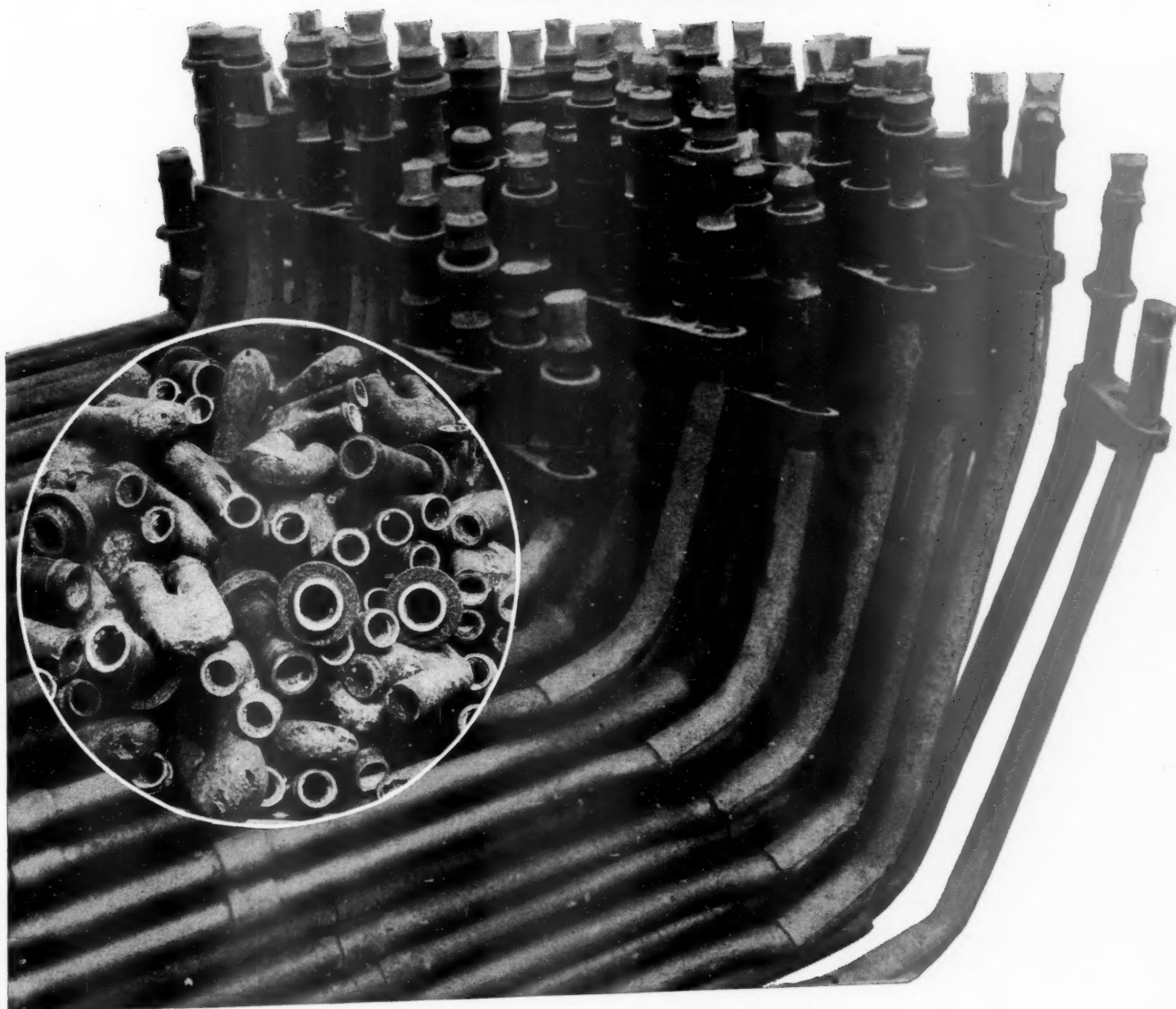
tional Carbon Company, Inc., with headquarters at New York.

J. W. Le Tourneau, general sales manager of **R. G. Le Tourneau, Inc.**, Peoria, Ill., has been promoted to general manager, a newly created office. **Denn M. Burgess**, eastern sales manager, has been promoted to domestic sales manager and has been succeeded by **Gordon S. McKenty**, district representative in the North Central states, who, in turn, has been succeeded by **Howard Stilley**, assistant field engineer. **Louis D. Le Tourneau**, district representative in the Pacific Northwest, has been promoted to central sales manager, and has been succeeded by **Jack Le Tourneau** of the service department. **John R. Bryan** has been appointed acting western sales manager.

Continued on next left-hand page

SUPERHEATER SERVICE

by **Obsolete Methods**



The method of manufacturing or repairing superheater units, as illustrated, has long since been discarded as obsolete.



Elesco new or REmanufactured units form one continuous pipe from ball end to ball end.

This is accomplished by machine-die-forging pipe lengths together.

The Elesco method is the cheapest and most satisfactory in the *long run*.

Keep abreast of superheater design with Elesco

THE SUPERHEATER COMPANY

Representative of American Throttle Company, Inc.

A-1218

NEW YORK

-

CHICAGO

-

MONTREAL

Financial

AKRON, CANTON & YOUNGSTOWN.—Trustee's Salary.—The Interstate Commerce Commission, Division 4, has approved the payment of \$12,000 per year as compensation to H. B. Stewart, Jr. as trustee of this company.

ALABAMA, TENNESSEE & NORTHERN.—Reorganization.—The Interstate Commerce Commission, Division 4, has ordered that the sum of \$9,700 be paid to John T. Cochrane, Jr., as substitute trustee and that the sum of \$416.33 per month be paid to the law firm of Armbrrecht, Twitty & Jackson of Mobile, Ala., for work done in connection with the reorganization proceedings of this company.

BALTIMORE & OHIO.—R. F. C. Loan.—This company has asked the Interstate Commerce Commission for modification of an order approving a \$8,233,000 Reconstruction Finance Corporation loan so that \$2,233,000 previously asked for to meet equipment trust maturities may be used for maintenance if and when obtained. Six million dollars of the loan has already been used for maintenance.

CANADIAN NATIONAL.—New Director.—Charles H. Read of Amherst, N. S., has succeeded D. H. McDougall of Stellarton, N. S., on the directorate of this company.

CHICAGO & NORTH WESTERN.—Abandonment.—The trustees have applied to the Interstate Commerce Commission for authority to abandon the Kenosha division extending from Bain, Wis., to Harvard, Ill., 39.4 miles.

CHICAGO, MILWAUKEE, ST. PAUL & PACIFIC.—Adjournment of Hearings Denied.—The Interstate Commerce Commission, Division 4, has denied the petition of the Guaranty Trust Company of New York for a postponement of hearings in the reorganization proceedings of this company from March 21, to May 21.

COLORADO & SOUTHERN.—R. F. C. Loan.—This company has filed with the Interstate Commerce Commission an amendment to its application for a R. F. C. loan of \$1,072,000 which is to be used to re-finance bonds of the Galveston Terminal, the net effects of which are to reduce the time of the loan and to strengthen the collateral now held by the R. F. C. and offered by the company for the new loan.

DENVER & RIO GRANDE WESTERN.—R. F. C. Loan Approved.—The Interstate Commerce Commission, Division 4, has approved a loan of \$1,800,000 to the trustees by the Reconstruction Finance Corporation.

ERIE.—Hearing on Trustee.—The Interstate Commerce Commission, Division 4, has postponed from March 18, to March 29, the date for public hearings on the petitions of John A. Hadden and Charles E. Denney for the ratification of their appointments as trustees of this company.

ILLINOIS CENTRAL.—Abandonment

and Operation.—The Interstate Commerce Commission, Division 4, has authorized this company to abandon the operation of its passenger trains over the line of railroad and bridge of the Union Pacific extending from a point in the vicinity of Fourth Avenue and South Thirteenth St., Council Bluffs, Iowa, to the point of connection with the tracks serving the Union Pacific's union passenger station, in Omaha, approximately 3.9 miles. The commission has also authorized this company to operate its passenger trains under trackage rights over a line of the Union Pacific extending from a connection with the company's line at Carter Lake, Iowa, to the connection with the tracks of the Union Passenger Station in the vicinity of Eighteenth St., Omaha, approximately three miles.

PENNSYLVANIA.—Annual Report.—The 1937 annual report of this company shows net income, after interest and other charges, of \$27,278,639, a decrease of \$11,463,453 as compared with net income in 1936. Selected items from the income statement follow:

	1937	Increase or Decrease Compared with 1936
Average mileage operated	10,306.07	-4.90
RAILWAY OPERATING REVENUES	\$455,933,509	+\$14,508,320
Maintenance of way	48,705,175	+9,208,478
Maintenance of equipment	98,149,649	+5,945,283
Transportation	163,828,923	+11,852,823
TOTAL OPERATING EXPENSES	337,961,293	+23,873,592
Operating ratio	74.13	+2.98
NET REVENUE FROM OPERATIONS	117,972,215	-9,365,272
Railway tax accruals	39,332,751	+4,618,602
Railway operating income	78,639,465	-13,983,875
Hire of equipment—Dr.	3,697,544	-2,161,618
Joint facility rents—Dr.	1,940,995	-642,590
NET RAILWAY OPERATING INCOME	73,000,927	-11,179,667
Non-operating income	37,559,228	+1,439,694
GROSS INCOME	110,560,154	-9,739,972
Rent for leased roads	51,248,994	-42,315
Interest on funded debt	28,011,309	-6,056
TOTAL DEDUCTIONS FROM GROSS INCOME	83,281,516	+1,723,481
NET INCOME	\$27,278,639	-\$11,463,453

PEORIA & EASTERN.—Securities.—The Interstate Commerce Commission, Division 4, has authorized this company to (1) issue at not less than par and accrued interest a promissory note for \$500,000, the proceeds to be applied to the payment at maturity on April 1, 1938, of an equal amount of Ohio, Indiana & Western first mortgage 50-year five per cent gold bonds, and (2) to issue \$500,000 of first consolidated mortgage 50-year four per cent bonds, to be pledged as part of the collateral security for the note.

READING.—Lease.—The Interstate Commerce Commission, Division 4, has approved a lease by this company of the properties of the Mount Carmel.

ST. LOUIS-SAN FRANCISCO.—Abandonment.—The trustees have applied to the Interstate Commerce Commission for authority to abandon (1) the Hunter branch extending from Williamsville, Mo., to

Hunter, 21.3 miles; (2) the Current River branch extending from Hunter, Mo., to Chicopee, 13.2 miles; and (3) the Grandin branch extending from Hunter, Mo., to Grandin, 6.1 miles.

SOUTHERN PACIFIC.—Bonds of the Texas & New Orleans.—The Texas & New Orleans has applied to the Interstate Commerce Commission for authority to issue \$60,607,000 of first and refunding mortgage bonds.

SOUTHERN PACIFIC.—Assumption of Liability.—The Interstate Commerce Commission, Division 4, has authorized this company to assume liability, as guarantor, for the payment of the principal of, and the interest on, \$2,500,000 of first mortgage 50-year five per cent gold bonds of the El Paso & Rock Island and \$577,000 of first mortgage and collateral trust 50-year five per cent gold bonds of the Dawson Railway & Coal Co.

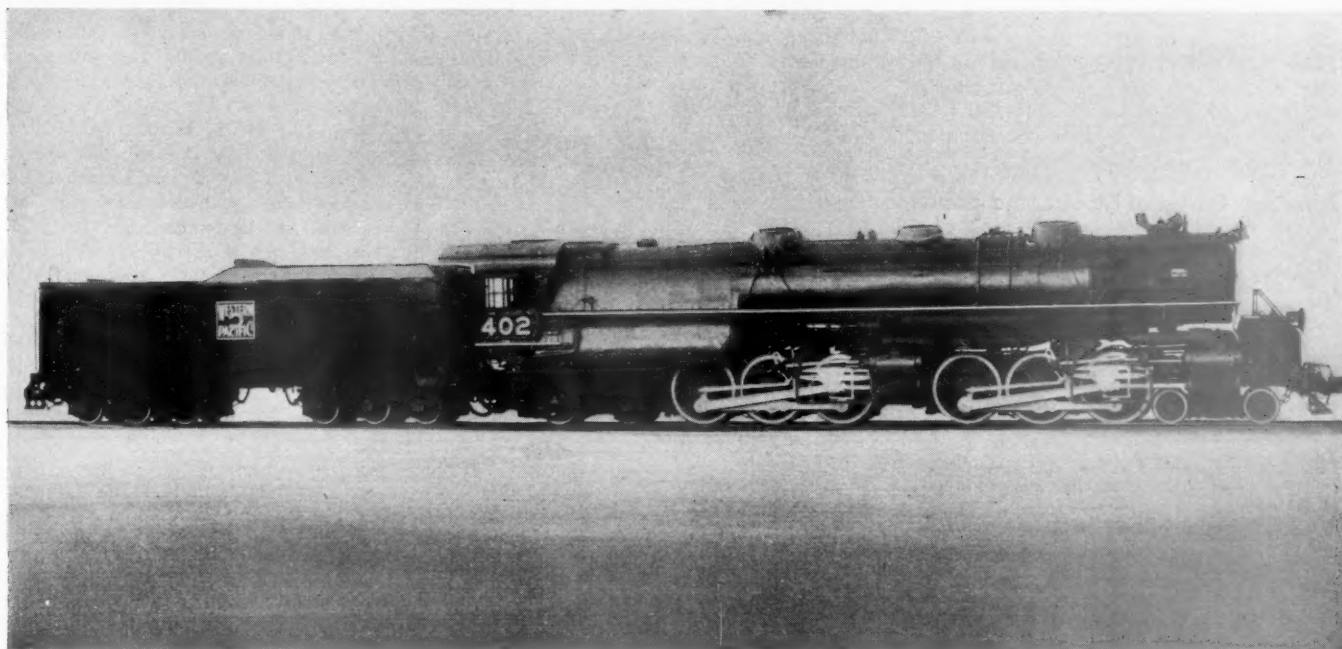
SOUTHERN PACIFIC.—R. F. C. Loan Application.—This company has applied to the Interstate Commerce Commission for authority to borrow \$14,000,000 from the Reconstruction Finance Corporation. The loan or loans would mature three years from the date of each advance by the R. F. C. and would bear interest at the rate of four per cent. Nine million dollars would be used for maturing equipment trusts and interest on funded debt and \$5,000,000 to repair damage to the company's property caused by the recent California floods.

SOUTHERN PACIFIC LINES.—Preliminary Report.—The preliminary report of this company's operations during 1937 shows net income after interest and other charges, of \$756,793, a decrease of \$13,746,537 as compared with 1936. Selected items from the income account follow:

	1937	Increase or Decrease Compared with 1936
RAILWAY OPERATING REVENUES	\$225,016,912	+\$20,678,361
Maintenance of way	23,763,209	+3,900,849
Maintenance of equipment	38,560,223	+4,787,369
Transportation	91,702,114	+15,880,153
TOTAL OPERATING EXPENSES	173,912,676	+25,678,827
NET REVENUE FROM OPERATIONS	51,104,236	-5,000,465
Railway tax accruals	16,998,747	+4,906,654
Equipment and joint facility rents—Net	11,489,207	+1,563,279
NET RAILWAY OPERATING INCOME	22,616,280	-11,470,399
Total other income	10,340,317	-2,481,520
TOTAL INCOME	32,956,597	-13,951,919
Rent for leased roads and equipment	24,894	-6,907
Interest on funded debt—Bonds and notes	30,021,046	+414,199
TOTAL FIXED CHARGES	30,703,494	+126,042
NET INCOME	\$756,793	-\$13,746,537

WESTERN PACIFIC.—R. F. C. Loan Approved.—The Interstate Commerce Commission, Division 4, has approved a loan of \$3,600,000 by the Reconstruction Finance Corporation to the trustees. The loan will bear interest at the rate of four per cent and will mature December 1, 1938.

Continued on next left-hand page



BUILT FOR WESTERN PACIFIC

POWER

99,600 pounds Tractive Power

SPEED

70" Drivers

MAINTENANCE

Lowest Possible both for
Locomotive and Right-of-Way

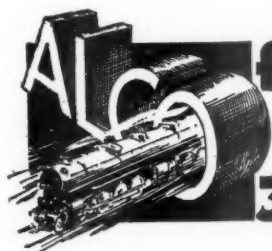
NEW POWER — NEW PROFITS

Weight on Drivers,
Weight of Engine,
Cylinders,

399,000 pounds
590,000 pounds
22 x 32 inches

Diameter of Drivers,
Boiler Pressure,
Tractive Power,

70 inches
265 pounds
99,600 pounds



AMERICAN LOCOMOTIVE COMPANY

30 CHURCH STREET · NEW YORK · N.Y.

WICHITA FALLS & SOUTHERN.—R. F. C. Loan Application.—This company has applied to the Interstate Commerce Commission for authority to borrow \$374,000 from the Reconstruction Finance Corporation. The loans would mature January 1, 1945.

Average Prices of Stocks and Bonds

	Last Mar. 15	Last week	Last year
Average price of 20 representative railway stocks..	27.06	28.45	60.77
Average price of 20 representative railway bonds..	59.73	61.94	83.80

Dividends Declared

St. Louis, Rocky Mountain & Pacific.—25¢; Preferred, \$1.25, quarterly, both payable March 31 to holders of record March 15.

Southern Railway.—Mobile & Ohio.—Stock Trust, \$2.00, payable April 1 to holders of record March 15.

Virginian.—\$2.00, payable March 30 to holders of record March 19; Preferred, \$1.50, quarterly, payable May 2 to holders of record April 16.

Construction

CHESAPEAKE & OHIO.—Work is being carried out by company forces to line a section of Princess tunnel at Princess, Ky., with treated timber, to cost about \$40,500. A contract has been given to the Elk Securities Company, Charleston, W. Va., for a change of line at England Hill, Ky., to cost about \$49,800.

CHESAPEAKE & OHIO.—The Interstate Commerce Commission, Division 4, has authorized this company to (1) operate as a branch line, an existing track extending from a point of connection with its Pond Fork subdivision, at or near West Junction, in a general northeasterly direction to the end of the track, approximately 3.2 miles, and to (2) construct a branch line extending from a point on the above-described track, at or near Van, in a southeasterly direction, approximately 6.6 miles, all in Boone County, W. Va.

Railway Officers

EXECUTIVE

Bernard J. Duffy, assistant general manager of the Kansas City Terminal Railway, Kansas City, Mo., has been elected president and general manager, to succeed **P. T. Wattson, Jr.**, who resigned to become president of the Terminal Railroad Association of St. Louis.

E. J. Dean, whose promotion to assistant to the vice-president of the Erie, with headquarters at Cleveland, Ohio, was reported in the *Railway Age* of March 5, was born on March 8, 1896, at Lowell, Mass., and was educated in the public and high schools of that city. He first entered railway service with the Boston & Maine on February 15, 1915, but left that company to go with the Erie as chief clerk to the New England freight and

passenger agent at Boston, Mass. He became junior commercial agent on July 1, 1922, and was promoted to senior commercial agent in June, 1925. He was ap-



E. J. Dean

pointed division freight agent at Dayton, Ohio on August 15, 1927, and in April of the following year was appointed industrial agent at Chicago. He returned to Boston on January 1, 1929, as New England freight and passenger agent, and became general New England agent there on March 15, 1937. He was holding this position at the time of his recent promotion.

FINANCIAL, LEGAL AND ACCOUNTING

Paul S. Bader has been appointed real estate agent of the Lehigh & New England. The position of assistant real estate agent has been abolished.

J. F. Dartt, assistant general auditor for the Illinois Central, with headquarters at Chicago, has retired after nearly 50 years railway service. Born at Susquehanna, N. Y., on July 10, 1872, he began his railway career at the age of 16 as office boy for the superintendent of the Susquehanna division of the New York, Lake Erie & Western (now the Erie). Between 1888 and 1903 he held various positions, becoming traveling auditor of disbursements accounts on July 1 of the latter year. He went with the Illinois Central on June 1, 1910, as special representative to the comptroller, became chief clerk to the comptroller on February 1, 1913, and chief clerk to the auditor of disbursements on May 1 of the same year. In September, 1913, he was made acting auditor of disbursements, and became auditor of disbursements on April 15, 1914. He was promoted to assistant general auditor on April 1, 1932. With Mr. Dartt's retirement, the position of assistant general auditor has been abolished.

OPERATING

A. D. Mims, assistant general manager of the Southern Pacific Lines in Texas and Louisiana, with headquarters at Houston, Tex., has been promoted to vice-president and general manager of those lines,

with the same headquarters, succeeding **L. B. McDonald**, whose appointment as general manager of the Southern Pacific Lines was announced in the *Railway Age* of March 12. **B. S. Hollimon**, superintendent of the San Antonio division at San Antonio, Tex., has been promoted to assistant general manager, replacing Mr. Mims, and has been succeeded by **J. D. Kinsler**, supervisor of wages on the Texas and Louisiana lines, with headquarters at Houston, Tex.

I. L. Pratt has been appointed acting superintendent of terminals of the Southern, with headquarters at Chattanooga, Tenn., during the illness of **J. W. Whitaker**.

TRAFFIC

A. G. Mathews, general agent of the Chicago, Burlington & Quincy, with headquarters at Pittsburgh, Pa., has been transferred to Detroit, Mich., and has been succeeded by **S. S. Hankis**, general agent at Cleveland, Ohio, who in turn has been replaced by **Robert Berman**.

MECHANICAL

J. M. Nicholson, who has been promoted to mechanical superintendent of the western district of the Eastern lines of the Atchison, Topeka & Santa Fe, as reported in the *Railway Age* of March 12, was born in Scranton, Kan., on February 24, 1888. After graduating from Kansas



J. M. Nicholson

State College he entered the test department of the Santa Fe on September 16, 1912, as a computer. In June, 1913, he was promoted to an assistant in this department, and on May 1, 1916, to laboratory foreman. The following August he was made fuel supervisor on the Missouri and Illinois divisions. He was promoted to assistant engineer of tests on May 26, 1921, and became fuel conservation engineer for the system on January 1, 1923. Mr. Nicholson was promoted to master mechanic on November 1, 1930, serving first on the Slaton division, then, after February 1, 1934, on the Eastern and Kansas City divisions, and, after July 1, 1937, on the Illinois division. He was

Continued on next left-hand page



Insures High Efficiency And Low Maintenance

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Liner



LINERS, Pistons and Packing Rings made from HUNT-SPILLER *Air Furnace* GUN IRON can take the severe punishment of heavy frictional wear and high temperatures in Diesel service.

Their wear-resisting qualities insure pressure tight performance, maximum efficiency, economical fuel consumption and low maintenance costs.

Applications in the Diesel engines of your switchers and streamlined power units, regardless of the make, will solve one of the difficult problems in the operation and maintenance of this type of prime mover.

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Cylinder Packing Rings
Pistons or Piston Bull Rings
Valve Bushings
Valve Packing Rings
Valve Bull Rings
Crosshead Shoes
Hub Liners
Shoes and Wedges
Floating Rod Bushings

Parts Finished For
Application

Dunbar Sectional Type Packing
Duplex Sectional Type Packing
for Cylinders and Valves
(Duplex Springs for Above
Sectional Packing)
Cylinder Snap Rings
Valve Rings All Shapes

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International Rwy. Supply Co., 30 Church Street, New York, N. Y.

Air Furnace **HUNT-SPILLER
GUN IRON**

appointed acting mechanical superintendent of the western district of the Eastern lines on July 20, 1937, and was confirmed as mechanical superintendent on March 9. He will continue to make his headquarters at Topeka, Kan.

OBITUARY

Charles H. Johnson, assistant chief engineer of the Nashville, Chattanooga & St. Louis, with headquarters at Nashville, Tenn., died on March 9 after a four-weeks illness.

Joseph A. Janney, Jr., president of the Huntingdon & Broad Top Mountain Railroad & Coal Company, with headquarters at Philadelphia, Pa., died on March 11, at the age of 68 years.

Thomas P. Soule, general supervisor of bridges and buildings on the eastern division of the New York Central, with headquarters at New York, died of pneumonia on March 12 in the Dobbs Ferry Hospital, Dobbs Ferry, N. Y., at the age of 61 years.

Ralph A. Feldes, assistant to the vice-president of the Indiana Harbor Belt, with headquarters at Chicago, died in that city on March 11, after an illness of two weeks. He was born at LaSalle, Ill., on August 19, 1883, and entered the employ of the New York Central System on March 1, 1905, in the engineering department of the Chicago, Indiana & Southern. He advanced through various positions in the engineering department and on July 25,

1917, entered the army, where he gained the rank of lieutenant-colonel of engineers in France. After the war he returned to railway service as assistant chief engineer of the Indiana Harbor Belt, which position he held until 1922, when he was promoted to chief engineer. On November 16, 1928, he was promoted to assistant to the vice-president of the Indiana Harbor Belt, which position he was holding at the time of his death.

William O. Wall, general claim agent of the Georgia & Florida, with headquarters at Augusta, Ga., died in the Hotel Pennsylvania, New York, shortly after his arrival on March 16. He was 56 years old, having been born on August 26, 1881, at Tazewell, Ga. Mr. Wall entered railroad service on August 1, 1899, with the Central of Georgia and served from April, 1907, to July, 1910, as freight claim agent of the Macon, Dublin & Savannah. From July, 1910, to August, 1914, he was general claim agent of the latter road, becoming general claim agent of the Georgia & Florida in August, 1914, serving also as general safety and publicity agent, and editor of the Georgia & Florida Bulletin.

Ira H. Hubbel, who retired on June 30, 1935, as assistant to the general freight traffic manager of the New York Central system, died of pneumonia on March 10 at the Misericordia Hospital, New York, after a brief illness. Mr. Hubbel was 70 years old, having been born in New York on June 18, 1867, and entered the service of the New York, West Shore & Buffalo (now part of the New York Central) in

May, 1883, as a clerk in the general freight office. In February, 1891, he was appointed chief clerk to the freight claim agent, and



Ira H. Hubbel

in July, 1898, to a similar position in the general freight agent's office. Since this time he had been consecutively, from 1901 to 1904, division freight agent at New York; 1904 to 1906, second assistant general freight agent; 1906 and 1907, first assistant general freight agent; 1907 to 1914, general freight agent; 1914 to 1925, assistant freight traffic manager; 1925 to 1929, freight traffic manager; 1929 to July 1, 1932, assistant traffic manager; July 1, 1932, to June 30, 1935, assistant to the general freight traffic manager. Mr. Hubbel then served as special representative of the vice-president in charge of traffic until the time of his death.

Operating Revenues and Operating Expenses of Class I Steam Railways

Compiled from 134 Monthly Reports of Revenues and Expenses Representing 141 Class I Steam Railways
FOR THE MONTH OF JANUARY, 1938 AND 1937

Item	United States		Eastern District		Southern District		Western District	
	1938	1937	1938	1937	1938	1937	1938	1937
Miles of road operated at close of month.....	235,422	236,276	58,065	58,330	44,721	44,816	132,636	133,130
Revenues:								
Freight	\$218,404,321	\$268,692,239	\$87,962,668	\$117,709,981	\$46,066,024	\$51,528,937	\$84,375,629	\$99,453,321
Passenger	37,474,067	37,441,227	20,653,713	20,503,147	6,002,360	5,997,056	10,817,994	10,941,024
Mail	7,867,400	7,939,071	2,960,479	3,009,521	1,424,660	1,401,234	3,482,261	3,528,316
Express	2,421,828	3,136,475	738,342	1,108,925	562,714	847,527	1,120,772	1,180,023
All other operating revenues	13,091,097	14,498,482	6,422,629	7,375,982	1,823,108	1,937,795	4,845,360	5,184,705
Railway operating revenues	279,258,713	331,707,494	118,737,831	149,707,556	55,878,866	61,712,549	104,642,016	120,287,389
Expenses:								
Maintenance of way and structures	30,610,239	33,103,794	11,953,889	13,859,874	6,299,345	6,945,529	12,357,005	12,298,391
Maintenance of equipment	58,305,398	67,808,476	24,473,076	31,578,614	11,257,407	12,104,274	22,574,915	24,125,588
Traffic	8,692,732	8,551,325	3,099,549	3,128,923	1,732,560	1,715,309	3,860,623	3,707,093
Transportation—Rail line	120,116,478	126,783,976	53,372,231	56,817,986	20,675,512	20,567,754	46,068,735	49,398,236
Transportation—Water line	415,017	492,719	415,017	492,719
Miscellaneous operations	3,501,926	3,480,272	1,612,812	1,567,473	519,032	529,616	1,370,082	1,383,183
General	11,223,118	13,617,314	4,402,217	5,923,898	2,154,550	2,353,783	4,666,351	5,339,631
Transportation for investment—Cr.	154,618	169,135	29,103	28,371	27,913	43,817	97,602	96,947
Railway operating expenses	232,710,290	253,668,741	98,884,671	112,848,397	42,610,493	44,172,450	91,215,126	96,647,894
Net revenue from railway operations	46,548,423	78,038,753	19,853,160	36,859,159	13,268,373	17,540,099	13,426,890	23,639,495
Railway tax accruals	28,813,189	28,057,364	11,767,747	11,297,706	6,136,466	6,385,839	10,908,976	10,373,819
Railway operating income	17,735,234	49,981,389	8,085,413	25,561,453	7,131,907	11,154,260	2,517,914	13,265,676
Equipment rents—Dr. balance	7,841,648	7,869,912	3,373,662	3,479,634	419,899	456,064	4,048,087	3,934,214
Joint facility rent—Dr. balance	2,973,698	3,244,639	1,647,992	1,895,503	318,554	305,268	1,007,152	1,043,868
Net railway operating income	6,919,888	38,866,838	3,063,759	20,186,316	6,393,454	10,392,928	2,537,325	8,287,594
Ratio of expenses to revenues (per cent)	83.3	76.5	83.3	75.4	76.3	71.6	87.2	80.3
Depreciation included in operating expenses	16,752,686	16,184,602	7,298,889	7,131,492	3,263,522	3,125,309	6,190,275	5,927,801
Pay roll taxes	8,301,370	7,282,780	3,613,381	3,066,616	1,546,925	1,353,724	3,141,064	2,862,440
All other taxes	20,511,819	20,774,584	8,154,366	8,231,090	4,589,541	5,032,115	7,767,912	7,511,379

d Deficit or other reverse items.

Compiled by the Bureau of Statistics, Interstate Commerce Commission. Subject to revision.